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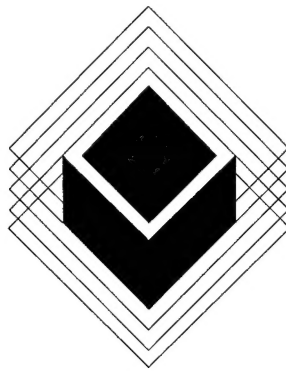
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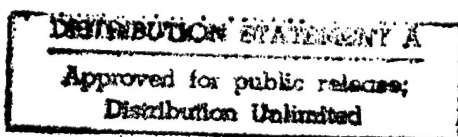
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Models for Action: Practical Approaches to Electronic Records Management & Preservation



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Models for Action: Practical Approaches to Electronic Records Management & Preservation

Project Report 98-1

July 1998

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Executive Summary

Organizations need records to carry out their business activities and to document actions and decisions. Today, most organizations increasingly manage work and make decisions on the basis of electronic information. Many transactions that were once paper-based are now being performed electronically, as networked computer systems that once played a purely supportive role have moved to center stage. However, with the shift from paper to digital information, many organizations find that their current electronic records are not sufficient to support the evidentiary needs of their business functions. Others face the problem of linking documents created in different forms and formats to business transactions. Many organizations are in danger of losing access to records stored in personal computers, e-mail boxes, or personal local area network directories. From an archival perspective, which focuses on long-term societal and organizational needs, problems like these mean records of enduring value are partially or entirely lost.

Without question, organizations need electronic records that are reliable and authentic, usable for multiple purposes, and accessible over time for both business and secondary uses. Unfortunately, traditional system design methodologies do not give adequate attention to the creation, integration, management, and preservation of electronic records. In many cases, redundant paper systems must be maintained or substantial additional resources must be expended in order to address records management requirements after information systems have been implemented.

Project Overview

The project described in this report was an attempt to develop a practical way to incorporate essential electronic records requirements into the design of new information systems. Funded in large part by a research grant from the National Historical Publications and Records Commission (NHPRC), the project was conducted from 1996 to 1998 through a partnership between the New York State Archives and Records Administration (SARA) and the Center for Technology in Government (CTG). The project team included staff of the NYS Adirondack Park Agency, eight corporate partners led by Intergraph Corporation, and University at Albany faculty and graduate students.

In recent years, significant theoretical work has been done in the area of electronic records management; however, little has been translated into practical implementable solutions. This project was designed to bridge the gap between theory and practice by producing generalizable tools that link business objectives to sound records management practices. This connection can be understood most readily at the business process level where workflow, information flow, and service delivery come together.

The project integrated and built upon several existing bodies of knowledge: electronic recordkeeping and archival theory and practice, business process improvement and reengineering (BPI/BPR) methodologies, and system development methodologies. The work was guided by four objectives:

- ◆ Create a set of general functional requirements for electronic recordkeeping.
- ◆ Create a practical tool to support the integration of application-specific electronic recordkeeping requirements into the design of networked computing systems.
- ◆ Develop and test a prototype system which reflects the use of the tool.
- ◆ Evaluate the effectiveness of the functional requirements and the tool.

The project produced two practical products:

Functional Requirements to Ensure the Creation, Maintenance, and Preservation of Electronic Records integrates theoretical and practical work in the areas of electronic recordkeeping and archives. It defines "record" as "the complete set of documentation required to provide evidence of a business transaction" and comprises three requirements:

- ◆ **Records Capture Requirement** - Records are created or captured and identified to support the business process and meet all recordkeeping requirements related to the process.
- ◆ **Records Maintenance and Accessibility Requirement** - Electronic records are maintained so that they are accessible and retain their integrity for as long as they are needed.
- ◆ **System Reliability Requirement** - A system is administered in accordance with best practices in the information resource management (IRM) field to ensure the reliability of the records it produces.

The Records Requirements Analysis and Implementation Tool (RRAIT). The RRAIT translates the Functional Requirements into a series of questions or cues that assist in the comprehensive identification of records management requirements during the design of a new information system. It is comprised of two components:

- ◆ **Records Requirements Elicitation Component (RREC)** facilitates the identification of records management requirements during business process improvement and systems analysis activities. The RREC is divided into three levels. The Business Process Level addresses the Records Capture Requirement and focuses on records requirements associated with the business process that is to be automated. The Record Level addresses the Records Maintenance and Accessibility Requirement and focuses on internal and external use and access to the record. The System Level addresses the System Reliability Requirement and focuses on

those records requirements associated with technology, system administration, and system configuration alternatives.

- ◆ **Records Requirements Implementation Component (RRIC)** focuses on the identification of management, policy, and technology strategies that address the records management requirements once they have been identified by the Business Process, Record, and System Levels of the RREC.

Using information gathered from interviews, business process improvement activities, and the use of the RRAIT, a prototype system was developed at the New York State Adirondack Park Agency (APA). APA was interested in improving the land use permit process and increasing access to records in order to reduce transaction turnaround time, increase staff productivity, and demonstrate predictability and consistency in its land use decisions. The prototype system is a networked document management and workflow system capable of accessing, analyzing, and capturing information from the Agency's geographic information system (GIS). It has the capacity to support a fully electronic record including the archiving of that record. The prototype served as a mechanism for identifying both the records requirements and management and policy strategies to support them in a full system implementation. It was evaluated in terms of agency benefits and costs, the degree to which the original set of records requirements was addressed, and the degree to which the tools met criteria for generalizability to other organizations.

Lessons learned

Business processes provide a common focus for records managers, archivists, technologists, and business managers. A business process perspective ties discussions of records management issues to work that is critical to an organization. By linking records management issues to business processes, the tools provide a common language for improved communication between records management professionals and other practitioners. Program managers indicated that this manner of presentation enabled them to understand the importance of records management requirements in terms of the issues that are critical to them in conducting their work. For technologists, the tools could be seamlessly integrated into the business process improvement phase of system design and generated requirements that led to well-defined system features and data requirements.

Comprehensive records management requirements directly support business objectives. The tools prompt participants to identify a comprehensive set of records management requirements associated with a business process. The Business Process Level of the RREC helps identify the specific record components that must be captured at each step during the course of a transaction. It also ties each component to specific legal or professional standards or organizational practices. The Record Level addresses the need for access to records over time. The RRIC can then be

used to identify technology and other mechanisms to ensure that that records are appropriately captured and that they remain accessible for both current and future use. Moreover, the tools are capable of identifying all authenticity requirements tied to the business process and they help identify the diversity of forms and formats that a system must be able to accommodate in order to assemble a complete record. These requirements are not limited to 'recordkeeping' needs; they are integral to the business process itself.

Current and future access needs can be specified and accommodated in system design. The tools have the ability to deal with both internal and external primary and secondary access to records. They also call attention to long-term access issues such as migration strategies and meta data that are best addressed at the initial system design stage. The Business Process and Record Levels of the RREC support the identification of access needs from the perspective of internal users during a business transaction as well as internal and external access needs after the transaction has been completed. The questions are designed to identify the components of a record required by each of these user types as well as their preferred or required access methods.

In system design, focus first on business needs and records that support them; then focus on technology. In general, the use of the tools shifts the focus of system design and development away from technology and toward the capture, maintenance, and ongoing use of business records. The tools embed the importance of the record into the system development process from the perspective of both users and system developers. Records management requirements based on business process analysis are directly translated into user and system requirements. The responses to the questions in the Business Process and System Levels of the RREC are easily communicated to system developers in terms of technical specifications. In addition, the questions that focus on the documents that comprise a record and on internal and external access to records are readily translated into data model specifications.

Focus on system functionality before choosing specific technologies. The tools help organizations identify the functionality that is required in a system to support records management requirements, and emphasize technology solutions that maximize inter-operability and adherence to standards. They do not address the actual selection of hardware and software to provide the necessary functionality. This selection must be based on many factors such as existing infrastructure (both technical and organizational), cost, and expected benefits. We strongly recommend that technology awareness activities be conducted in conjunction with the use of the tools. Product reviews, vendor presentations, and conferences focused on technology applications are all ways to increase awareness of technology capabilities and limitations among the staff who will work with the new system. These kinds of activities increase understanding of the strengths and weaknesses of various technology choices.

Supporting policies and management practices are essential, but challenging, components. The RRIC, with its focus on implementation, highlights the importance of policy and management strategies — critical elements that often receive little or no attention in system development efforts. The tools facilitate the identification of related management and policy strategies, such as the range of user permissions and definition of a minimum legal record. Policies and practices ensure the entire organization is working in concert with the records management requirements that are built into the electronic system. In most organizations, these issues present the most difficulty because their content and execution depend on organizational consensus about the way work should be done.

All record users need to participate in the identification of requirements. One of the most critical factors for effective use of the tools is getting the right people to answer the questions. All primary and secondary users of the records that will be created and maintained by an information system should be represented in the elicitation of the records requirements. Other players who may not be direct records users, such as legal staff and executives, need to be involved in the development of management and policy strategies that will support users. Not every group needs to be involved in the entire process, but each needs to participate actively at the appropriate points so that all user needs are identified and incorporated into the system design.

The records requirements tools can be used in a variety of ways. The tools provide a sound framework for the identification of records management requirements that can be modified to suit the setting in which they are used. While we strongly recommend that the Business Process Level of the RREC be used in conjunction with business process analysis or improvement activities, the questions in the other sections can be posed using a variety of methods such as surveys and interviews. The manner in which the questions are asked and answered can be tailored for use across different organizational contexts. They should be selected for their compatibility with the organization's skills and time schedules, and their ability to minimize the total cost of the information collection process.

Awareness and willingness to change are preconditions for success. Perhaps the biggest weakness of the tools is the pre-condition for their use. That is, an organization must first recognize the importance of its business records and the costs and risks associated with ignoring them. Without this foundation, it is unlikely that an organization will invest the time and attention to detail that the tools demand. While the tools support the comprehensive identification of records management requirements and mechanisms for addressing them, the degree to which they are implemented depends on the organization's readiness and willingness to change. Change means more than new information systems; it requires supporting management and policy strategies as well as an understanding of the degree to which the requirements can be addressed by the chosen technologies. In sum, while the tools support the identification of requirements, the factors that surround their implementation determine the ultimate level of success.

Chapter 1. Project Overview

Globalization, an unabated quest for efficiency, and public demands for high quality services are driving organizations in every sector to improve the way they conduct business and serve their customers. Technology is a key factor in this trend and its rapid advance has stimulated major changes in the way organizations work internally and how they interact with their suppliers, partners, and customers.

This thirty-year trend began with mainframe computing in the 1970s when much operational and financial data began to be created and managed in digital form. During the 1980s, the widespread use of microcomputers led most office documents to be created electronically. However, the installation of local and wide area networks in the late 1980s and early 1990s, along with the recent advent of the Internet and World Wide Web, have created the most rapid and far-reaching changes in how organizations communicate and conduct business. For example, e-mail is replacing the telephone as the communication means of choice for conducting internal business; intranets, not interoffice mail, are offering widespread, secure communications for a wide range of business functions. Today, many organizations are taking advantage of such technologies as electronic data interchange, digital imaging, geographic information systems, and groupware to support paperless transactions. These technologies have a substantial impact on the ability of organizations to create, manage, and use records to support legal responsibilities and business needs.

Within both the public and private sectors, decisions are increasingly made on the basis of information that appears on employee computer screens. Many transactions that were once paper-based are now being performed electronically, as networked computer systems that once played a purely supportive role have moved to center stage. This shift away from reliance on paper-based transactions has compelled many organizations to rethink the way they perform recordkeeping functions. If organizational decisions are to be based on the information contained in these networked systems, then we need to be sure that the information is identified, collected, and preserved in accordance with sound electronic recordkeeping practices.

But what exactly are 'sound electronic recordkeeping practices?' And how do you go about implementing them in your organization? In truth, the term denotes far more than the basic maintenance of electronic data. It also refers to the development and implementation of sound management and policy structures to support organizational recordkeeping requirements commensurate with attendant business needs and capable of preserving the integrity of electronic information for both current and future uses. In

order to conduct business electronically and to take full advantage of new technologies, organizations need to create, manage, and maintain electronic records that are:

- ◆ accessible over time for business and secondary uses
- ◆ reliable and authentic - to stand up in legal and administrative forums
- ◆ usable for multiple purposes

The current environment

As a result of the trends toward electronic information, many organizations are in danger of losing access to records stored in personal computers, e-mail boxes, or personal local area network directories. Consequently, many find that their electronic records do not meet their evidentiary needs and they are therefore forced to maintain duplicative paper files. Others face the problem of linking documents created in different forms and formats to business transactions. For example, a government agency that issues land use permits may need to access a paper file folder, e-mail messages, word processing files, and maps and other geographic information in order to obtain a complete record of a permit transaction.

The absence or loss of electronic records takes a serious toll on both the creating organization and society, particularly when records of enduring social and cultural value are lost to future generations. In fact, substantial and damaging losses of electronic records have been documented:

- ◆ Ontario Hydro's nuclear power plant near Toronto could find no record of a crucial reactor sealing ring that had suddenly begun to wear out several years earlier than expected. The records manager of the huge provincial utility blamed the lost records on the recently installed computer network and worker unfamiliarity with the company's new practices for storing documents.
- ◆ The US National Aeronautics and Space Administration (NASA) recently discovered that some 1.2 million magnetic tapes of observations created during three decades of space flight could not be read or sometimes even found. Many tapes were uncataloged; heat or floods had damaged others. Many could not be associated with the mission, spacecraft, or computer system which created them. NASA officials estimate it will take millions of dollars and years of detective work to link these files to their missions and then decode the information so that hardware and software now in use can read them.

- ◆ In the late 1960s, New York State and Cornell University undertook the Land Use and Natural Resources Inventory Project (LUNR). LUNR created a computerized map and primitive geographic information system of New York State depicting patterns of land usage and natural resources. It was created by superimposing a matrix over aerial photographs of the entire state and coding each cell according to its predominant features. In the mid-1980s, the New York State Archives obtained copies of the tapes containing the data from the LUNR inventory along with the original aerial photographs and several thousand mylar transparencies. State Archives staff attempted to preserve the LUNR tapes, but the problems proved insurmountable. The LUNR project's customized software programs were not saved with the data and the hardware and operating system needed to run the software were no longer available.

From an archival perspective, which focuses on long-term societal and organizational needs, problems like these mean records of enduring value are partially or entirely lost. Perhaps more importantly, organizations are finding that their current electronic records are not sufficient to support the ongoing needs of their business functions. In many cases, redundant paper systems must be maintained or substantial additional resources must be expended in order to address records management requirements after information systems have been implemented. Therefore, organizations need immediate and specific solutions and tools that will help them integrate electronic records management requirements into their applications and business processes. Unfortunately, traditional system design methodologies do not give adequate attention to the creation, integration, management, and preservation of electronic records. The project described in this report was an attempt to develop a practical way to incorporate essential electronic records requirements into the design of new information systems.

Center for Technology in Government project

The National Historical Publications and Records Commission (NHPRC) assists in national efforts to identify, preserve, and provide public access to records through research grants made to state and local archives, colleges and universities, libraries, historical societies, and other nonprofit organizations throughout the United States.

Responding to the growing need for practical tools to support government electronic recordkeeping, the State Archives and Records Administration (SARA) and the Center for Technology in Government (CTG) jointly submitted a proposal to NHPRC in 1995 to conduct a project entitled *Models for Action: Developing Practical Approaches to Electronic Records Management and Preservation*. SARA and CTG, long-time partners in supporting

***Organizations
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records and
their business
objectives.***

government agencies in their use of information and technology, proposed to develop a set of practical tools that integrate records management requirements into the system design process. NHPRC awarded a two-year research grant to conduct the project.

The CTG-SARA proposal recognized that organizations increasingly rely on networked systems to perform or support business processes. In fact, customized application systems such as electronic commerce and office automation systems that involve databases, e-mail, and word processing have assumed an integral role within many organizations. However, most organizations lack adequate tools to manage the number and variety of electronic records in a networked environment. Since it is both logical and critical that organizations incorporate effective electronic records management practices into the normal course of business, the proposal argued that these practices must be addressed at the system development stage. In this way, system features and functionality will capture, maintain, and ensure access to electronic records and, ideally, associated management and policy issues will be addressed.

Significant theoretical work has been done in the area of electronic records management and several organizations have attempted to implement practical solutions. This work can be categorized into three types:

- ◆ NHPRC-funded or similar projects focused on records management and archival issues
- ◆ Initiatives by archival, records management, or information resource management institutions or units focused on identifying functional requirements for recordkeeping as part of their organizational missions
- ◆ System development initiatives that seek to implement requirements for electronic recordkeeping

Little of the theoretical work that has been done in the area of electronic records management has been translated into practical implementable solutions. Further, the system development initiatives that have included consideration of electronic recordkeeping requirements have, for the most part, resulted in organization-specific document management requirements. These requirements are focused primarily on technical aspects of system development and implementation and neglect to consider the necessary supporting management and policy strategies. We believe these efforts have had limited value because they lack a generalizable operational connection between records management practices and the achievement of an organization's business objectives.

The tools developed by this project were designed to bridge that gap by producing practical generalizable tools to support the identification of organization-specific business objectives and records management practices. This connection can be understood most readily at the business process level where workflow, information flow, and service delivery come together.

Project objectives

The primary goal of the project was to develop and promote practical tools to assist government agencies and business organizations in addressing electronic records management and archival requirements as they develop networked computing and communications applications. Project activities were focused in four areas:

- ◆ Creation of a set of general functional requirements for electronic recordkeeping
- ◆ Creation of a practical tool to support the integration of application-specific electronic recordkeeping requirements into the design and development of networked computing systems
- ◆ Development and testing of a prototype networked workflow and document management system which reflects the use of the tool
- ◆ Evaluation of the effectiveness of the functional requirements and the tool in enhancing the essential recordkeeping capabilities of the prototyped application.

In order to be generalizeable to other settings, the tools and techniques needed to be flexible enough to apply to diverse business processes and organizations. Therefore, they needed to meet the following criteria:

- ◆ Focus attention on creating and managing usable electronic records as systems are developed
- ◆ Assist in building adequate electronic records management functionality into these systems
- ◆ Ensure that the electronic records created meet evidentiary as well as informational needs
- ◆ Ensure that electronic records are captured and accessible to all users
- ◆ Ensure that documents created in different forms and formats are linked to business transaction requirements
- ◆ Assist in the identification and integration of supportive but essential records management policies and management practices

Project participants

In addition to CTG and SARA, the project team included staff from the Adirondack Park Agency; a project advisory committee of records management experts representing a wide range of academic, government, and private sector entities; faculty and students from the University at Albany; and a number of corporate partners. A list of the project participants is provided in Appendix A.

The New York State Adirondack Park Agency

The New York State Adirondack Park Agency (APA) is mandated by its enabling statute, the Adirondack Park Agency Act (Executive Law, Article 27) to formulate land use development regulations and long-range policy for the 6-million acre Adirondack Park. The 3.5 million acres of private lands in the Park are governed by the Adirondack Park Land Use and Development Plan, adopted by the NYS Legislature in 1973. This plan classifies the Park's private lands into six categories according to their ability to withstand development without significant adverse environmental impacts. The number of buildings allowed varies, depending on the private land use classification. Further, depending on the classification of the private land parcel on which it is proposed, permits for many types of development are required. In participating in this project, APA sought to improve the land use permit process in order to reduce transaction turnaround time, increase staff productivity, and demonstrate predictability and consistency in its land use decisions. The land use permitting process was an ideal test case for the project tools since it needs to integrate information from diverse physical and digital formats, and is highly dependent on the ability to identify and retrieve information about previous Agency actions. A wide range of Agency staff worked with CTG and SARA in a series of activities including individual interviews, surveys, workshops, technical assessments, training, prototype installation and use, and evaluation.

Advisory Committee

The Project Advisory Committee, drawn from the public, private, and academic sectors, met three times during the project. During these meetings the Advisory Committee reviewed project goals and deliverables and provided comments and recommendations reflecting their diverse perspectives and disciplines. Committee members were provided with proposed project plans, draft products, and other materials for review prior to meetings. The Advisory Committee was composed of information and electronic records management practitioners from a variety of professional settings, including government, banking, health care, and insurance. The individual members of the Project Advisory Committee are listed in Appendix A.

Academic Partners

A faculty member from the Department of Public Administration and Policy at the University at Albany, conducted a two-day workshop to evaluate the costs and benefits of an electronic land use permit system at APA. Several graduate assistants from Computer Science, Public Administration, Information Science, and Management Science and Information Systems participated as members of the project team as well. The graduate assistants participated in the development and implementation of the project research, facilitation plans and workshops, prototype design and development, and project reporting. All are listed in Appendix A.

Corporate Partners

The corporate partners in the project were:

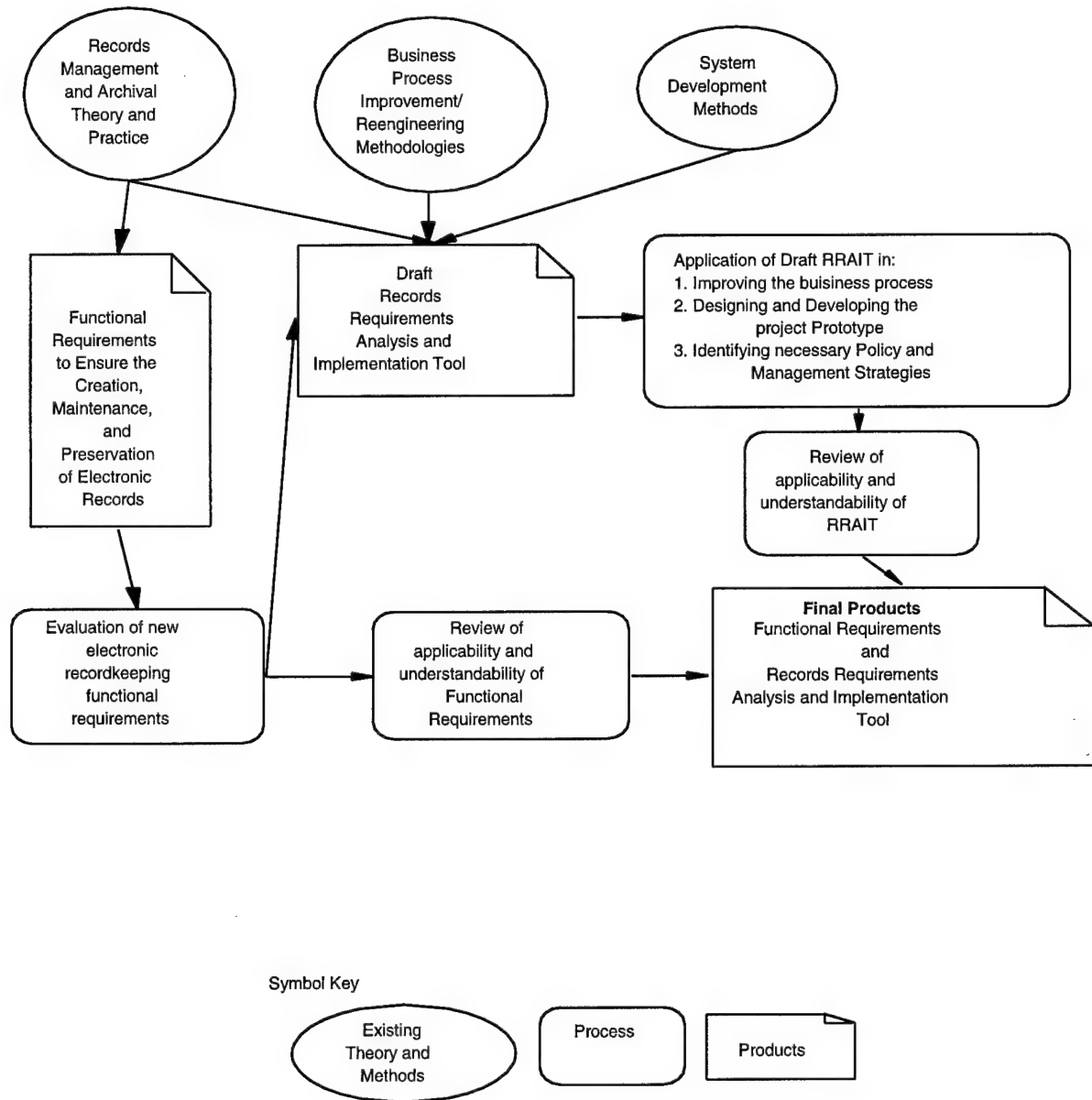
- ◆ Audio Visual Sales and Service
- ◆ Hewlett-Packard
- ◆ Intergraph Corporation
- ◆ Image Conversion Systems
- ◆ MediaServ
- ◆ Microsoft Corporation
- ◆ Oracle Corporation
- ◆ Sybase Inc.

The primary corporate partner was Intergraph Corporation. Intergraph provided the hardware and some software to support the development and use of the prototype both at CTG and at the Adirondack Park Agency. Intergraph also provided significant professional services in the design and development of the project prototype. Oracle, Microsoft, and Sybase each provided a range of software products to support the prototype efforts. Image Conversion Systems provided scanning services by converting a selected set of paper project files to digital form with the necessary indices for use in the prototype. MediaServ provided consulting during the conceptual phase of the prototype design activities and Audio Visual Sales and Service provided specialized projection equipment in support of project presentations.

Project workplan

The project activities were conducted between Summer 1996 and Spring 1998. A detailed chronological list of project and information dissemination activities is included in Appendix D. Three interim reports of project activities and results were submitted to NHPRC at six month intervals. These reports are available on the CTG Web site at <http://www.ctg.albany.edu/projects/er/ermn.html>

Figure 1. Models for Action workplan overview



As illustrated in Figure 1, *Models for Action* integrated and built upon four existing bodies of knowledge: electronic recordkeeping theory and practice, archival theory and practice, business process improvement and reengineering methodologies, and system development methodologies. The first product, *Functional Requirements to Ensure the Creation, Maintenance, and Preservation of Electronic Records*, integrates theoretical and practical work in the areas of electronic recordkeeping and archives. This product was reviewed and evaluated by expert practitioners before being translated into a series of questions or cues that comprise a new step that can be incorporated into existing BPI/BPR methodologies resulting in our second product, *The Records Requirements Analysis and Implementation Tool (RRAIT)*. The RRAIT is comprised of two parts: the Records Requirements Elicitation Component (RREC) and the Records Requirements Implementation Component (RRIC). The RREC facilitates the identification of records management requirements during business process improvement and system analysis activities. The RRIC focuses on the identification of management, policy, and technology strategies that address the requirements once they have been identified. Combined, these components facilitate the identification and implementation of application-specific records management requirements. Both components were refined based on review by the Project Advisory Committee.

The subsequent activities were designed to test the RRAIT in the automation of a record-intensive business process at the New York State Adirondack Park Agency (APA). A prototype system focused on APA's minor project review process was designed and developed incorporating technical features that ensure the required electronic records management functions were addressed. Additionally, supporting management and policy strategies were identified. The prototype system was evaluated in terms of agency benefits and costs; the degree to which the original set of electronic functional requirements was addressed in the prototype system; and the degree to which the tools met the criteria for generalizability to other organizations. Experience with the tools and the prototype in this real-world setting led to further refinements in the RRAIT.

Models for Action rests on four bodies of knowledge - records management, archival theory & practice, business process improvement, and system development methods.

Chapter 2. Tools for Identifying and Implementing Electronic Recordkeeping Requirements

The project focused on the development of practical tools to support the integration of electronic records management considerations into business process analysis and system design activities. Two products were developed over the course of the project:

- ◆ Functional Requirements to Ensure the Creation, Maintenance, and Preservation of Electronic Records
- ◆ Records Requirements Analysis and Implementation Tool (RRAIT)

These products were tested and refined in the development of technical specifications, the identification of associated policy and management strategies, and the creation of a prototype electronic system to support the land use permit process at the New York State Adirondack Park Agency (APA). This chapter describes these project products. Chapter 3 presents their application at APA.

Functional Requirements to Ensure the Creation, Maintenance, and Preservation of Electronic Records

This section outlines the development, content, and use of *Functional Requirements to Ensure the Creation, Maintenance, and Preservation of Electronic Records*. This set of requirements was the conceptual keystone for much of the project and is reflected in the project's other products. The Models for Action (MFA) *Functional Requirements* were developed to communicate to program and information technology managers what standard organizations must achieve to ensure that electronic records are created, maintained, and preserved to support their operational, informational, and evidentiary needs. These requirements need to be implemented in any system developed to support electronic recordkeeping.

The first iteration of the *Functional Requirements* was developed in the spring and summer of 1996. These were based on *Functional Requirements for Recordkeeping* developed in "Variables in the Satisfaction of Archival Requirements for Electronic Records Management," a research project of the School of Library and Information Sciences at the University of Pittsburgh (Pittsburgh Project). They were also informed and influenced by "Preservation of the Integrity of Electronic Records," a research project of the University of British Columbia; the US Department of Defense *Records Management Application Functional Baseline Requirements*; the National Archives and Records Administration's (NARA) instructional guide for *Federal Agencies Records Management Requirements for Electronic Recordkeeping*; and the work of a number of other institutions.

The project goal was to develop a set of functional requirements for electronic records management that could subsequently be translated into questions or cues to identify specific requirements related to a business process. Although based on the requirements produced in the Pittsburgh Project, the MFA *Functional Requirements* focus on the systems that create records rather than on the records themselves. Systems were defined to encompass policy and management practices as well as technology components.

Table 1. Initial Categories of Functional Requirements
1. Record Compliance - Legal and administrative requirements as well as best practices for recordkeeping related to a specific business process are addressed, including those requirements specific to the field or discipline that the system will support.
2. System Reliability - A system is administered in line with best practices in the information resource management (IRM) field to ensure the reliability of the records it produces.
3. Records Capture - Records are created or captured and identified to support the business process and meet all recordkeeping requirements.
4. Records Maintenance - Electronic records are maintained so that they are accessible and retain their integrity for as long as they are needed.
5. Records Useability - Electronic records are usable for the purposes for which they were created and can be exported into an integral, accessible, usable format from the creating system to other systems. This includes the ability to transfer the records to an archival repository if necessary.

The definition of a 'record' used in the development of the MFA *Functional Requirements* was, "any information received in the normal course of business and retained as evidence of organization, function, policies, decisions, procedures, operations or other activities, or because of the information contained therein." This definition was a generalized version of the legal definition of 'record' for management and archival preservation found in New York State law as well as laws in many other states.

The initial MFA *Functional Requirements* contained five categories as shown in Table 1.

Based on feedback from the Advisory Committee and a group of national and international archival and records management experts, the *Functional Requirements* were refined. In addition, two significant simplifications resulted from the translation of the *Functional Requirements* into questions or cues designed to elicit application-specific records management issues—we redefined ‘record’ for purposes of the requirements and collapsed the number of requirements from five to three:

1. **Redefinition of ‘record.’** The original definition was judged too vague to be implementable in a practical tool and a redefinition was adopted built around the concept of a business transaction. ‘Record’ was redefined as “the complete set of documentation required to provide evidence of a business transaction.”
2. **Revised Categories of Functional Requirements.** The five categories of requirements were collapsed into the three based on the following rationale:
 - It became clear that *Compliance* is not an independent requirement. Rather, it is an attribute achievable through the effective identification, implementation, and subsequent monitoring of the specific records management requirements associated with a business process.
 - Parts of the *Records Maintenance* requirement were already accounted for in the *Records Capture* requirement. Therefore, redundant requirements were eliminated or integrated into *Records Capture*. The remaining requirements of *Records Maintenance* were combined with the closely related requirement, *Records are Usable*, to create a new requirement - *Records Maintenance and Accessibility*.

The revised categories of functional requirements are shown in Table 2 and described more fully below.

Table 2. Revised Categories of Functional Requirements
1. Records Capture - Records are created or captured and identified to support the business process and meet all recordkeeping requirements related to the process.
2. Records Maintenance and Accessibility- Electronic records are maintained so that they are accessible and retain their integrity for as long as they are needed.
3. System Reliability - A system is administered in accordance with best practices in the information resource management (IRM) field to ensure the reliability of the records it produces.

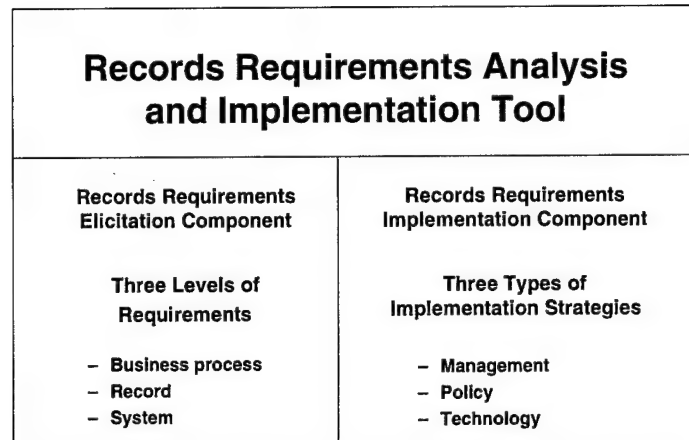
Underpinning all three requirements is the concept of 'compliance.' The laws, regulations, and policies that authorize or define a specific government business process will either explicitly or implicitly define the recordkeeping requirements for that process. These requirements identify what records must be created and may define requirements for records management, access, content, and structure. In addition, many professions or disciplines have established standards or best practices for recordkeeping related to their fields. An organization must identify these requirements and determine how they will be implemented. In addition, changes in the legal and regulatory environment and in professional standards need to be monitored and reflected in modifications to the requirements. Each requirement can be mapped to a compliance factor based in law, regulation, standard, or best practice. The use of the term 'best practice' refers to practices formally adopted or generally accepted by a profession or discipline. Examples of best practices include Generally Accepted Accounting Principles and the American Health Information Association's Recommended Practices for Information and Documentation.

This set of three requirements has proven valuable in communicating electronic records management concepts and issues to both business and IT professionals. Accordingly, SARA will publish them as part of a technical leaflet designed for state and local government officials on defining records in the modern information technology environment.

The Records Requirements Analysis and Implementation Tool

The Records Requirements Analysis and Implementation Tool (RRAIT), summarized in Figure 2, is the second project product. The tool was developed to support the identification of records management requirements as well as the strategies for their implementation. The RRAIT is comprised of two parts: the *Records Requirements Elicitation Component* (RREC) and the *Records Requirements Implementation Component* (RRIC). The RREC provides a framework for the identification of records management requirements during business process and systems analysis stages of information system design. The RRIC focuses on the identification of management, policy, and technology strategies for implementing the requirements once they have been identified.

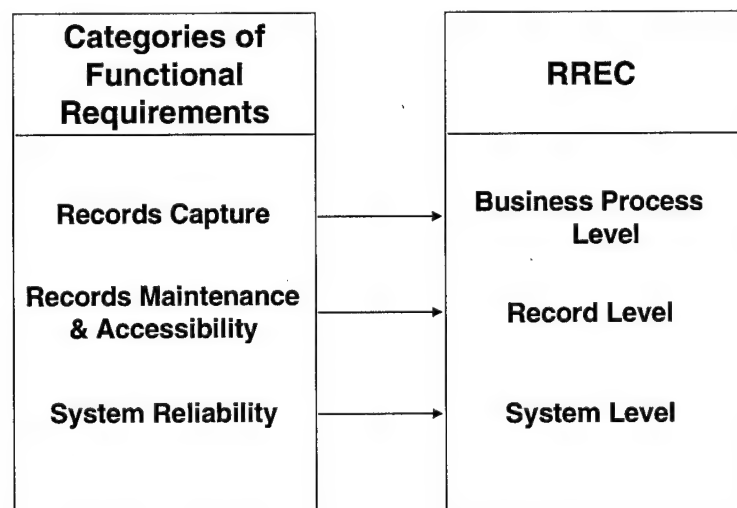
Figure 2. Overview of the RRAIT



The Records Requirements Elicitation Component (RREC)

The purpose of the Records Requirements Elicitation Component (RREC) is to translate the *Functional Requirements* into a set of questions or prompts that assist in the comprehensive identification of application-specific records management requirements. The goal is to seamlessly integrate the capture of these requirements into activities normally conducted during business process improvement and system design. The RREC is divided into three components: The Business Process Level, the Record Level, and the System Level which map back to the three categories of *Functional Requirements*, as shown in Figure 3.

Figure 3. Mapping the Functional Requirements to the RREC



The Business Process Level focuses on those records management requirements associated with the business process that is to be automated. The Record Level focuses on the identification of records management requirements that surround the record after it has been generated during the course of a business transaction or process, while the System Level focuses on those records management requirements associated with technology, system administration, and system configuration alternatives. Figures 4a-4c provide an overview of the three levels of the RREC and records management issues addressed by each.

Business Process Level

The Business Process Level of the RREC was developed to support the identification of records management requirements associated with a given business process. It is also designed to distinguish sub-tasks and records management requirements that are required by law, regulation, professional requirements, or organizational policy and practices. These distinctions are important in terms of justifying requirements and determining which, if any, sub-tasks can be eliminated or modified.

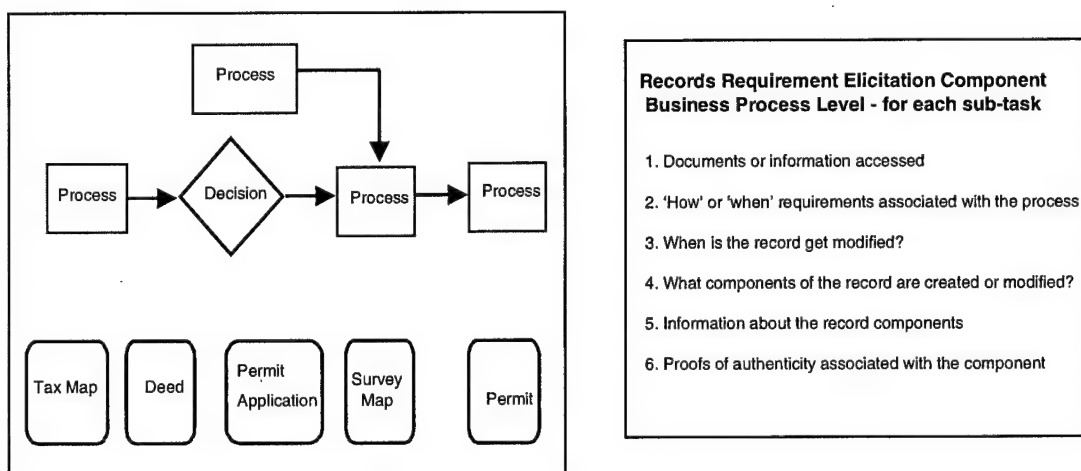
As shown in Figure 4a, this level of the RREC seeks information at the record component and business process levels. The records management requirements gathered at this level are focused on collecting information about the process itself, and the modifications to records at points in the process, in terms of how the record is modified (what is added, deleted, or changed) and who should have authority to make the modifications. It also identifies what information about the components (such as individual documents, associated graphics, or signatures) should be collected and maintained.

The Business Process Level questions help to identify required information about time clocks associated with the process to ensure that information about start and end times associated with a given task are captured. It also calls for the identification of other information or documents that may need to be accessed and consulted but perhaps not integrated into the record so that, at minimum, the system will allow for references to these sources. This section of the RREC also captures information about the types of documents that the information system will need to integrate into the record, as well as any proofs of authenticity such as original signatures, notarizations, or electronic time stamps that must be captured at the document or record component level.

The Business Process level section of the RREC also supports the identification of objects (another way to think of components of a record) that can later become the objects in an object-oriented database structure.

This section also gathers the required meta data (information about the object including when it was modified and by whom) for each of the objects or components of a record. The full set of questions from the Business Process Level of the RREC can be found in Appendix E.

Figure 4a. Business Process Level of the RREC



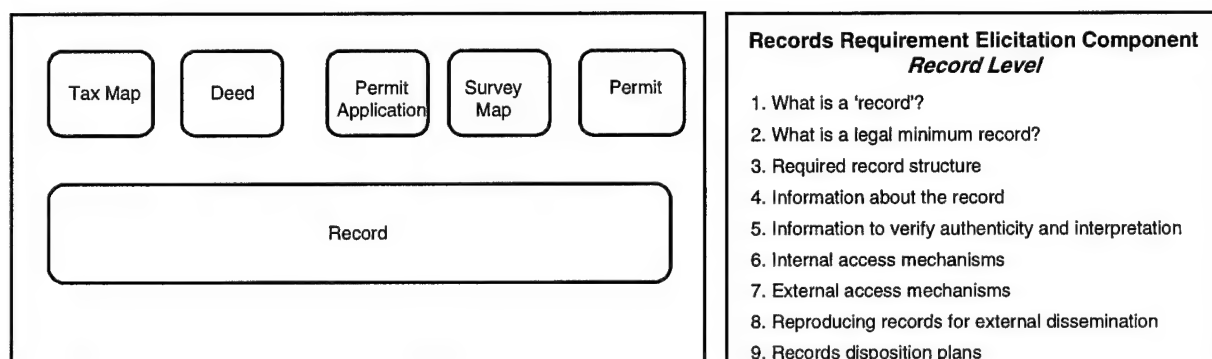
The Business Process Level section of the RREC was implemented very successfully in the context of a business process improvement activity. There are a number of ways that the background information can be gathered to support the business process improvement activity. For example, interviews, surveys, and focus groups could be conducted to gather preliminary information.

Record Level

As shown in Figure 4b, the primary unit of analysis for the Record Level of the RREC is the record itself. In general terms, this section of the tool seeks to capture records management requirements associated with access and use over time, for both the record in aggregate and its component parts. The questions are focused on capturing records management requirements related to the access and maintenance of records once they have been created or after a business transaction has been completed.

This section of the RREC also identifies the specific components of the record that must be retrievable and reproducible for use by both internal and external secondary users. It also focuses on the identification of an organization's records disposition plan, including the individual(s) responsible for disposing of records according to the plan and those responsible for modifying or updating the plan. The full set of questions for the Record Level of the RREC are shown in Appendix E.

Figure 4b. Record Level of the RREC



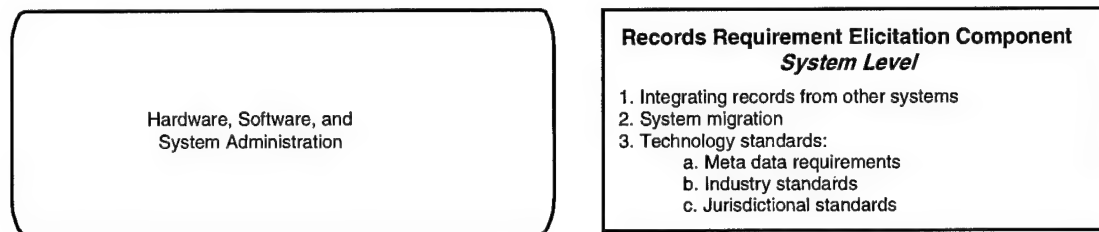
The Record Level specifies the information that needs to be collected in attempting to identify a comprehensive set of records management requirements, but it does not dictate the mechanisms by which the questions are asked and answered. Several methods can be useful. For example, the answers could be acquired through interviews of relevant staff, conversations with experts such as the legal staff, group decision conferences, or surveys. The method used to answer the questions outlined in the Record Level of the RREC should be determined in much the same way a research method would be selected to answer a research question. A variety of factors need to be considered and the most cost-effective mechanism for gathering the information should be used.

System Level

The System Level of the RREC is more directly related to technology than the other sections. As shown in Figure 4c, the questions at this level are focused on how a system will support the integration of the information and documents (record components) identified at the Business Process and Record Levels. In other words, the Business Process Level questions facilitate the identification of what information and documents must be integrated into a record, the Record Level focuses on how the record and its components will be maintained and accessed over time, and the System

Level focuses on how, from a technical standpoint, the information system will accommodate the integration of and ongoing access to record components. This section also poses questions about future system migrations, focusing on the types of hardware and software platforms that the system may be migrated to over time. These questions prompt the user to consider the feasibility of alternative migration plans which may have an effect on current technology choices.

Figure 4c. System Level of the RREC



The System Level questions also seek to capture meta data, industry standards, and jurisdictional requirements associated with specific technology. For example, technologies such as digital imaging, GIS, and EDI may require different types of meta data and may require that certain standards are met within a given state or nation, or these standards may be tied to commonly accepted industry standards. Additionally, industry, organizational, or professional standards for system administration, back-up, and disaster recovery are identified through this section of the RREC.

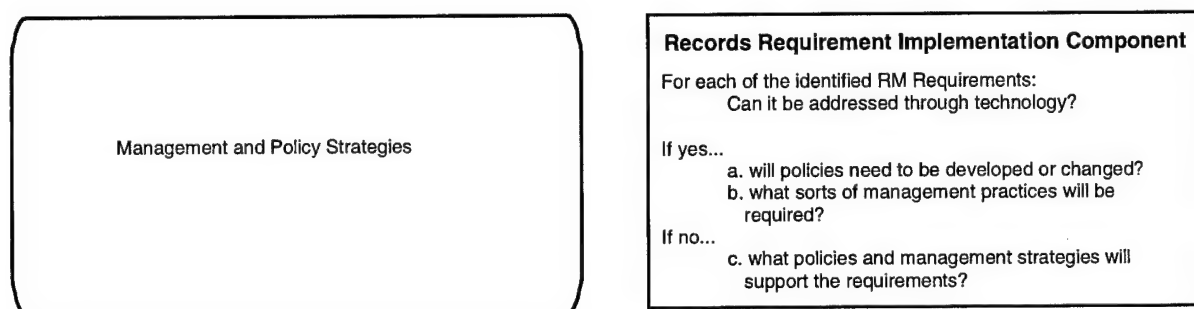
Records Requirements Implementation Component (RRIC)

The Records Requirements Implementation Component (RRIC) focuses on the identification of strategies or mechanisms that can be used to address the full set of records management requirements identified through the Business Process, Record, and System Levels of the RREC.

As shown in Figure 5, the RRIC focuses on the identification of technology, management, and policy strategies to address the requirements identified through the Business Process, Record, and System Levels of the RREC.

The RRIC (see Appendix E) provides an organizing framework for records management requirements and strategies for addressing them. In some cases, the same technology, management, or policy strategies may address a range of records management requirements. In other cases, specific strategies may be necessary to ensure that the individual requirements are met. For example, one requirement might state that the record of a

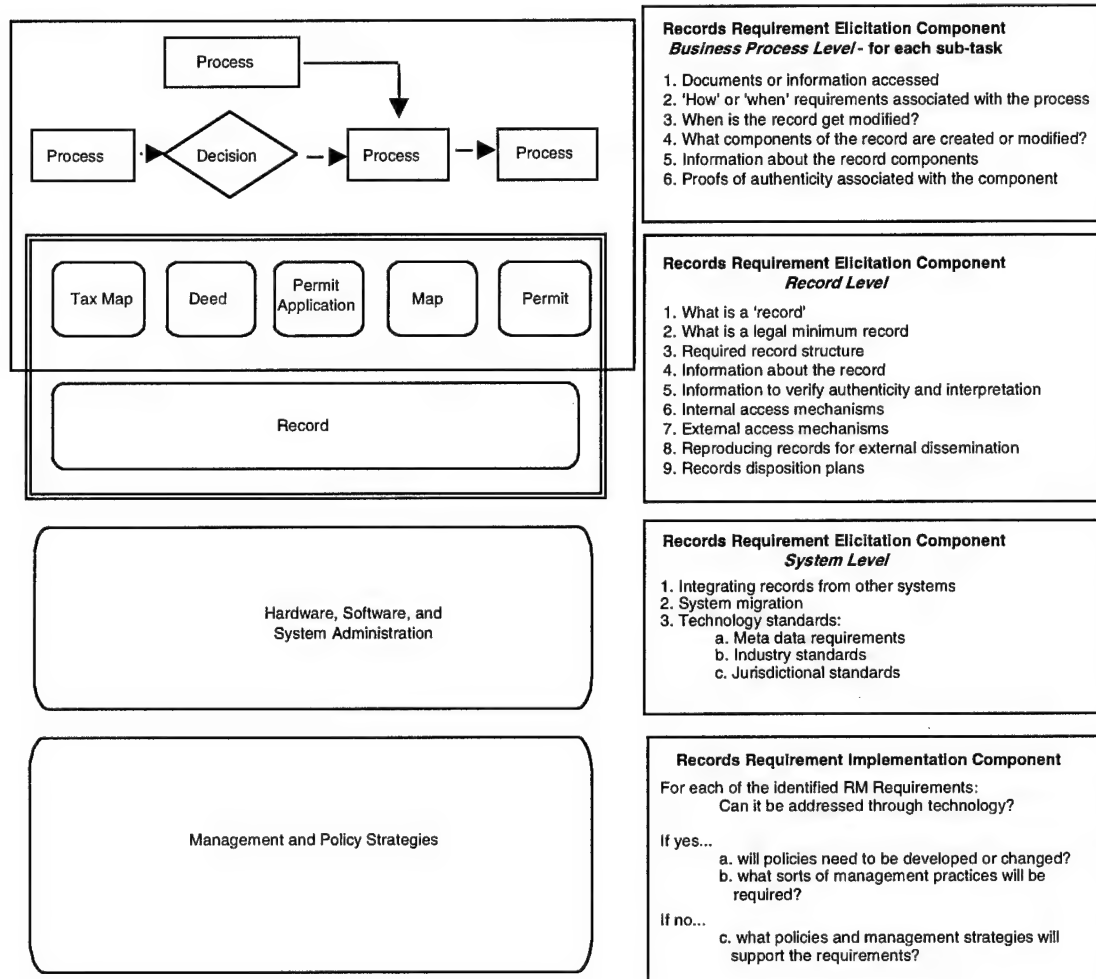
Figure 5. Implementation Component



completed transaction should be moved into an archival vault at which point no further modifications can be made to the record. This requirement may be supported by technology through the use of workflow features which would move the record into another location after the final step in the process has been completed. However, policies must be created that state clearly what the components of a 'final record' should be and when a record is deemed 'final.' Further, management practices must be put in place to govern who is authorized to move the record into the vault and what components of the record must be maintained in the archive. Once the management and policy strategies have been determined, technology can be used to allow only the person authorized to archive a record the technical permission or capability to do so. The technology can also be used to provide an audit trail to ensure that only that individual, at the right time, has archived the record. Another policy that would support this requirement would be a prohibition against sharing user IDs and passwords among the system users.

Figure 6 completes the conceptual overview of the RRAIT by combining the levels and components into an integrated picture of the tool and its various areas of emphasis.

Figure 6. Conceptual Overview of the RRAIT



Chapter 3. Testing the Tools at the Adirondack Park Agency

This chapter presents the activities undertaken with the Adirondack Park Agency to test the practicality of the tools in supporting the development of an electronic system that addresses electronic records requirements as part of the permitting process.

Records management issues at APA

In its capacity as regulator of development and subdivision in the 6 million acre Adirondack Park, APA serves a varied clientele. Owners of land within the Park seek advice on whether a permit is necessary for proposed development projects or as a condition of mortgage financing and similar real property transactions. APA issues permits after determining that the proposed development satisfies statutory and regulatory requirements. In issuing a permit, the Agency is required to consider 37 statutorily enumerated development considerations. Permits are recorded in County Clerks' offices, and 'run with the land' very similar to a deed, binding subsequent purchasers and other grantees of the land involved. Each permit contains extensive and detailed findings about the proposed project; the environmental setting including the land use area in which the development is to take place; the proximity of the project to navigable waters, wetlands, historic preservation areas and endangered species habitats; and the impact the proposed development will have on the Park's environment. Permits indicate the conditions under which adverse impact on Park resources can be minimized. In addition, input from owners of property adjoining a proposed development site is weighed. The agency also issues formal legally binding 'letters of non-jurisdiction' when it determines that no permit is required for a proposed project.

In accordance with the Agency's regulations, information about any prior Agency actions associated with a project parcel must be reviewed in decisions about the issuance of land use permits for new development projects. Since 1973, the Agency has reviewed over 12,000 development projects and subdivisions, averaging over 350 permits issued each year. These records alone total over 150,000 pages including 6,000 large format maps in separate locations. In addition, APA maintains a variety of other records related to real property including reported violations of the three environmental laws administered by the Agency. About 1,000 multi-page letters constituting binding legal advice about whether a permit is necessary

are also issued annually. These and other land management documents, including legal opinions, jurisdictional advice, vested rights decisions, electronic and paper maps, photographs and other non-standard documents, dating from 1973 to the present, are used in decision making about new land use development in the Adirondack Park.

This array of information is stored in file cabinets, map trays, microfiche jackets, film canisters, boxes, closets, stairwells, and any other available space in the Agency's 16,000 square foot office. Access to these records has been limited to the Ray Brook headquarters and is confounded by a lack of personnel to manage extensive paper files along with various special media and formats. At the same time, however, the Agency has developed an extensive capability using geographic information system technologies. It has created or enhanced automated maps to describe the extent and characteristics of land use areas depicted on the Official Adirondack Park Land Use and Development Plan Map and to prompt key environmental issues for permit review staff.

The Agency's goal in participating in the project and more generally in learning about alternative options for the development of an electronic land use permit system, were focused on improving service to customers through the use of information technology. More specifically, APA was interested in improving the land use permit process and increasing access to records in order to:

- ◆ Reduce transaction turnaround time
- ◆ Increase staff productivity
- ◆ Demonstrate predictability and consistency in its land-use decisions

Testing the RRAIT with APA

The project tools were tested in the context of improving the Agency's minor project review process. A number of techniques were used to capture the records requirements including interviews, surveys, and group decision conferences.

Capturing records requirements with the Business Process Level of the RREC

The Business Process level of the RREC was used in business process improvement (BPI) activities with APA. The BPI activities served multiple purposes: to create a consistent view of the process shared by all its participants, to identify modifications to the process that would increase staff productivity and improve customer service, to identify the records management requirements associated with the process, and to define the workflow to be embedded in the prototype system described below.

A number of preliminary activities were conducted prior to the two-day BPI activity with APA. First, interviews were conducted with approximately 15 staff members. The purpose of the interviews was to identify issues associated with the process from the perspective of the staff involved in it. The interviews also elicited issues associated with access to agency records. A preliminary process model was then developed and used as a starting point for the BPI activity. This model documented the current minor project review process and identified issues associated with access to records as part of the process. Subsequently, a business process improvement activity was conducted, using the Business Process Level of the RREC. (A brief description of the steps involved in the use of the Business Process Level of the RREC is provided in Appendix E.) The improved process and the preliminary set of associated records management requirements became the foundation for automating the review process and for identifying the management and policy strategies that would support it. This activity demonstrated that the Business Level of the RREC:

- ◆ could be seamlessly integrated into business process improvement activities
- ◆ aided in the identification of sub-tasks that could be eliminated or moved to other parts of the process
- ◆ prompted the participants to identify a comprehensive set of records management requirements associated with the business process
- ◆ facilitated the identification of management and policy issues that need to be addressed in support of a full system implementation

Capturing records requirements with the Record Level of the RREC

A staff survey was used to gather information specified in the Record Level of the RREC. The questions focused primarily on internal secondary use of project records and identified the types of documents or components of a record that individual staff members require, as well as their preferred mode of access. The survey asked which other agency business processes or purposes might require access to the project record, and, for each process or purpose, which components of the record need to be accessed and what are the most efficient and effective ways of gaining access (e.g., by project number, land owner's name, project type, staff member assigned). The identified document types and access indexes became the foundation for an object-oriented database which was used in the prototype.

Other activities associated with the Record Level included a review of additional potential modifications to the minor project review process, confirmation of the required components of a record of a minor permit transaction, and information about each of the record components and the record itself required to support access and usability over time.

The process of testing the Record Level section of the RREC showed that the questions were, for the most part, easily understood and answerable by APA staff. For some questions, such as the identification of a legal minimum record, the staff decided that additional work would be required to develop final recommendations. In other cases, the answers were easily acquired and translated into records management requirements for a full system implementation.

Capturing records requirements with the System Level of the RREC

The System Level of the RREC is focused on how a new system will support the integration of information and documents identified in the Business Process Level. In other words, the Business Process Level questions facilitate the identification of *what* information and documents must be integrated into a record, while the System Level section focuses on *how*, from a technical standpoint, the information system will accommodate the integration.

After specifying the different types of documents that must be integrated into a record of a minor permit transaction, technology options to support this integration were identified. Digital imaging of all documents submitted to the Agency from applicants and other external parties was selected to accommodate a number of different types of documents. The Agency's recent acquisition of a large format scanner will accommodate the digitization of E-size maps and a multi-page scanner was acquired to support the digitization of smaller documents. Agency documents generated in electronic form would be included in the record. Scanning those documents that have associated proofs of authenticity such as original signatures and notarization, was chosen as the most effective mechanism for maintaining a legal record of the transaction. Integrating the prototype with the existing GIS system was selected as the way to ensure that necessary maps and related information are maintained as part of a record. All of the documentation for a project record can be linked through the document management capabilities of the products used in the development of the prototype.

Conceptually, all of the project documents maintained within the system can be linked in a project record through the object-oriented data model. For those documents, such as satellite photographs, which cannot physically be included as components in a project record, the inclusion of index and location information was deemed sufficient.

In order to minimize effort in terms of future migration, a tool that supports the viewing of documents created in over 70 different formats across a variety of software packages was selected to support the prototype. This capability decreases the number of different packages for which migration concerns will be an issue.

A review of technology policies and standards, including those developed by the NYS Office for Technology, was conducted by CTG and SARA staff and provided to the Agency for consideration in a full system implementation.

Testing the RRIC at APA

A number of policy and management issues emerged during the records requirements elicitation phase. Some could be addressed by technology but others required management decisions or agencywide policies for their resolution.

For example, APA needs to establish a definition of a minimum legal record for a project transaction. A related issue, identified during the cost-performance workshop, had to do with the contents of a completed project review record. At present, when a project review is completed, all materials, regardless of long-term value are retained in the file. This includes material such as telephone messages, informal notes, and draft documents that may have been valuable during the work process but have very limited or no continuing value to the agency. When freedom of information law (FOIL) requests are received, the FOIL officer must review each document in a record and physically separate those that are releasable from those that are not. In addition, she must provide the requester with a list of non-releasable documents in the file. This is invariably a cumbersome and time-consuming process that could be minimized by an agencywide policy stating what should be maintained in a record after a transaction has been completed and defining the standard components of that record that are not releasable under FOIL.

The RRIC helps identify and evaluate technology, management, and policy strategies to support the implementation of records management requirements. In many cases, technology can be used to support records management requirements, but the costs of implementing these technology strategies may be very expensive or not cost-effective in terms of overall system or business goals. Therefore, the RRIC assists organizations in analyzing the cost-effectiveness of technology strategies versus management and policy strategies in addressing records management requirements.

A number of technology options were identified over the course of the project that would support the records management requirements of APA's minor project review process. Workflow and document management were identified as key technologies to support records management requirements. These technologies range from very complex systems that require substantial customization in order take full advantage of their capabilities to more simple off-the-shelf packages that rely less on customization and more on human processes and procedures. For example, the Business Process Level of the RREC identified who should be able to change a project record at various stages of the project review

process. These requirements could be addressed through the use of workflow software and the development of rules within the system that allow or deny access to the record or its individual components. The development of the rules within the workflow system would require substantial customization and therefore substantially more development time. Alternatively, the Agency could establish a set of policies or procedures that do not rely on technology for their implementation.

In order to estimate the relative costs and benefits of technology strategies to support records management requirements, a two-day cost-performance modeling conference was conducted with APA staff in April 1998. The workshop was designed to evaluate the potential costs and benefits of various levels of a fully implemented system, based on experience with the prototype. In particular, it sought to identify benefits in terms of reducing transaction turnaround time (*faster*), quality improvements (*better*), and decreases in cost per transaction (*cheaper*) that would result from various levels of full system implementation. While the benefits of system implementation would accrue to other work processes in the Agency, the primary focus of the workshop was on the Agency's minor project review process. The workshop activities both applied the RRIC and affirmed its usefulness in terms of its ability to focus on the management and policy strategies required to support full system implementation.

The workshop activities produced:

- ◆ estimates for minor project review processing times (elapsed time and time on task)
- ◆ three alternative levels of full system implementation
- ◆ cost estimates for the three levels of system implementation
- ◆ estimates of potential benefits in terms of cost savings, quality improvements, and decreases in transaction turnaround time for each level

Based on the analysis conducted during the workshop, the sophisticated workflow component of the prototype did not appear to offer sufficient marginal benefit over marginal costs from the perspective of the participants. Under this scenario, the records management issues that would have been addressed through the workflow capabilities would therefore have to be addressed through management and policy strategies. This limited analysis provided an example for the Agency to use in future decision making about full system implementation and it provided a useful framework for making choices among technology strategies, and management and policy options for meeting records management requirements.

A prototype system to support the minor project review process at APA

A prototype system to support APA's minor project review process was based on information gathered from the interviews, business process improvement activities, and the use of the RRAIT. It was designed to help APA staff determine which features and functionality of a fully implemented system would best support the Agency's productivity and customer service goals. The prototype also served as a mechanism for identifying management and policy strategies that would need to be developed to complement the system implementation. The following technology components were used in the development of the prototype system:

- ◆ Document management
- ◆ Geographic information system
- ◆ Workflow
- ◆ Database
- ◆ User interface
- ◆ Networking and communications technology

The prototype is a network-based integrated document management and workflow system capable of supporting a fully electronic record of the minor project review process. It is also capable of accessing, analyzing, and capturing information from the Agency's geographic information system (GIS) and archiving the project record. The prototype functionality includes:

- ◆ Document imaging and document management
- ◆ User-friendly data entry screens
- ◆ Assignment of project staff
- ◆ Routing of work to appropriate staff
- ◆ User-friendly search capabilities
- ◆ Automatic forms generation
- ◆ Access to the Agency's GIS
- ◆ Archiving of project records

The improved APA project review process

A high-level diagram of the improved project review process that resulted from the BPI work and the use of the RREC is shown in Figure 7. It represents a number of changes from the current process, some enabled by technology and others representing changes to the process itself or changes in the manner or order in which the sub-tasks of the process are completed. An example of a technology-enabled change is the parallel processing made possible by simultaneous access to digital project records. As can be seen from the figure, projects often require consultations from natural resource staff, such as soil scientists or wetlands biologists, as well as legal consultation. Under the current paper process, the review and analysis must be conducted sequentially as there is only one copy of the project file. This technology-enabled change would allow these reviews to take place concurrently. Technology could also improve project-related correspondence. For example, standard language for permits and additional information requests could be automatically inserted in these documents as they are prepared for specific project applications, thus saving staff time and assuring consistency across projects. Other types of correspondence, currently generated on paper or in electronic form, are passed among staff for review in either hardcopy or by an exchange of disks. A networked system would improve performance by eliminating the use of 'sneaker net' in the sharing and review of Agency correspondence.

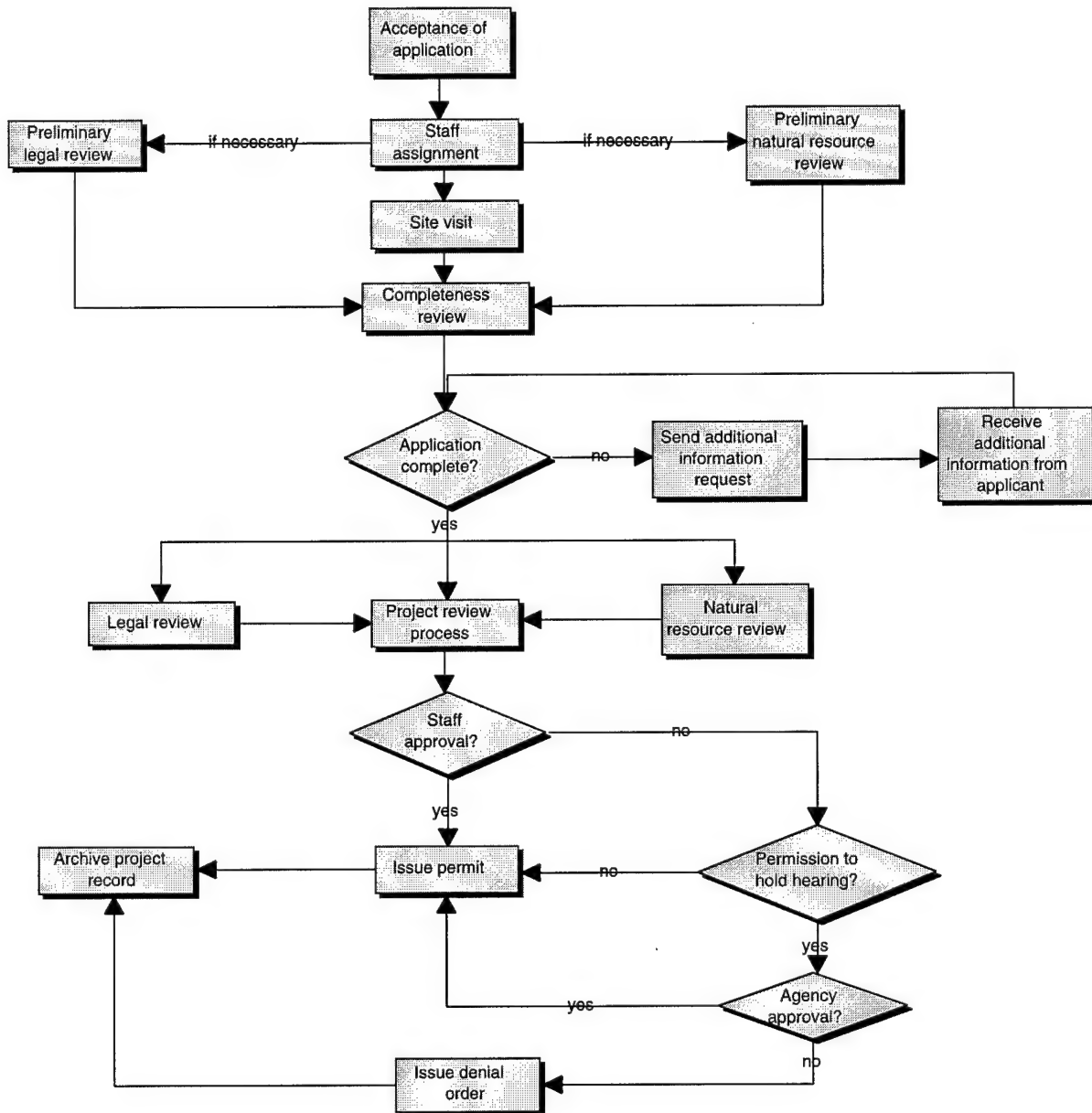
Process-related records management requirements

The use of the Business Process Level of the RREC led to the identification of the records management requirements within the project review process at the sub-task level. During the initial business process improvement activity, five sub-tasks were identified:

- ◆ Acceptance of application
- ◆ Completeness review
- ◆ Project review process
- ◆ Permit approval
- ◆ Archiving

The *Acceptance of Application* sub-task includes initial receipt and cursory review of an application, assignment of staff including the Project Review Officer (PRO) and any required natural resource or legal staff, and forwarding the electronic application folder to the appropriate staff. A diversity of documentation is integrated into the project file during this sub-task such as the application, a site plan map, deeds, tax maps, and information about prior Agency actions on the project property. During the initial review, paper maps or digital spatial data is also accessed in-house and integrated into the record. An electronic system must therefore accommodate or reference the location of the project documents and other

Figure 7. The improved APA project review process



***Each sub-task
of the minor
project review
process adds to
or modifies the
record of the
transaction.***

information sources used to support this sub-task. In addition, the receipt of an application starts a 15-day statutory clock. Information about the receipt date and the number of elapsed days since receipt is a critical activity required by state law. A number of authenticity requirements are important. For example, the original signature on the permit application is required by law, the date stamp on the application is required by regulation. Therefore, an electronic system must maintain proofs of authenticity. At this initial point in the process, only two individuals, the Director of Regulatory Programs (DRP), and the Secretary, are authorized by Agency practice to change the project record.

Under the revised technology-supported process, the *Completeness Review* sub-task begins when an assigned PRO receives the project file. The file is simultaneously available to legal and natural resource staff. The level of involvement of these staff may vary from simple notification that the project has been started to specific issues that need to be addressed in the project review. Information related to the 37 statutory development considerations must be accessed during this sub-task and items such as additional paper maps, GIS data, deeds, narratives of map analyses, property history notes, and engineering reports are integrated into the record. Site visits are conducted during this sub-task and therefore site visit notes, soil analysis results, visual analysis reports, and narrative about the potential impacts on other affected landowners is integrated into the record during the completeness review. If an Additional Information Request (AIR) is issued, this document is also integrated into the record. Under the current system the DRP, PRO, and Secretary are authorized to make changes during this phase. Under the modified process, legal and natural resource staff would also have authorization to add comments or documentation to the record or documents within it. Since this sub-task must be completed within 15 days of the receipt of the application, the timeclock must be updated. If the application is deemed incomplete, and an AIR is issued, the statutory timeclock is stopped until such time as the additional required information is received from the applicant. The AIR has authenticity requirements such as original signatures and an executed Notice of Complete Application once a project application has been deemed complete. It is also Agency practice to maintain a copy of the certified mail receipt from the AIR mailing.

During the *Project Review* sub-task, the components added to a record include memos reporting consultations with staff from APA and other agencies such as the NYS Department of Environmental Conservation (DEC), notes from meetings with the applicant, confidentiality requests, and determinations of trade secret status. The project review process must be completed within 45 days of the date that the application was deemed complete for minor projects. Therefore, timeclock information must be maintained. Under the current process only the PRO and the Secretary are authorized to change the record during this sub-task, but in the improved process legal and natural resource staff would also be able to modify certain elements of the record during their concurrent review. No authentication requirements were identified for this sub-task.

The *Permit Approval* sub-task results in either the issuance of a permit or a referral to the Agency Board for a public hearing. In the case where the permit is approved by APA staff, the record will include drafts of the permit, results of public comment, comments on permit drafts, a copy of the approved plan, the final issued permit, a reference to any oversized map (those that are too large to be included in a paper project file), and a transmittal letter to the applicant. In addition, the permit must be filed with the County Clerk's office. Once this is done, a stamped card is received by the Agency from the County Clerk and is also integrated into the project record. Proofs of authenticity include an original signature and notarization on the permit, the stamped card from the County Clerk's office, and a certified mail receipt. The issuance of a permit stops the regulatory review clock for the project and information about the end date must be included in the record. During this sub-task, the PRO, DRP, Executive Director, and Secretary are authorized to change the record.

If APA staff do not approve the project, a request for public hearing before the Agency Board is drafted and included in the project file. Additional memos from consultations may be added to the project file. The Board will issue either a denial order or a permit, and one or the other is added to the project record. If the project does go to public hearing, Agency Board minutes will also be included in the project record. Authentication requirements include an original signature on either the permit or the denial order. If a permit is issued, the other documentation noted above is also included in the record.

The modified process reflects a new sub-task in the process for *Archiving* a completed project record. This step involves the purging of documents in a project record that are not required for long-term access. Ideally, the project record would be reduced to the level of a minimum record in terms of legal and evidentiary requirements and secondary uses. Modifications to the record during this sub-task are made only by the archivist or the DRP.

Prototype components

The following section discusses the components of the prototype system and ties these components to the records management requirements described above.

Document imaging and document management

The prototype supports the scanning of all documents that are submitted to the Agency in application for a permit. The imaging component of the prototype supports the records capture requirements associated with the project review process, while the document management functionality supports many of the records access requirements. Additionally, document

imaging was used to capture proofs of authentication. Scanned images of original signatures and notarization were deemed to be sufficient for legal admissibility of the record.

For each document, the prototype provides a data entry screen to capture information about the document itself. For example, if a map is submitted to the Agency with an application, the data entry screen for a map document allows for the entry of such information as the type of map (e.g. survey map, sketch, wetlands map), as well as the map scale, the map creator, and the date the map was created. As documents are scanned into the system, they are attached or related to the appropriate project record. Figure 8 shows the types of documents that can be accommodated by the prototype system. The bold-face type on some of the document types indicates that there is a document of that type in the project record. This functionality captures information about the components of a record as specified earlier by use of the Record Level of the RREC.

Figure 8. Screen showing documents in a record

Add Document			
AIR	Formal Intra-agency	Informal Written Within APA	Incoming Correspondence
Outgoing Correspondence	Deed	Denial Order	Enforcement Record
Hearings	Interagency Memos Sent	Interagency Memos Received	Interagency Project Notice
Project Notice Form	Project Review Resource Inventory	JIF Record	APA Project Maps
Tax Maps	Wetlands	Notice List	Permits
Photos	Permit Applications	Permit Reconsideration	Permit Amendment
Permit Appeal	Permit Renewal	Site Visit Sketches	Site Visit Field Notes
Site Visit Field Notes Soil			APA Minor Project Application Form
Cancel			

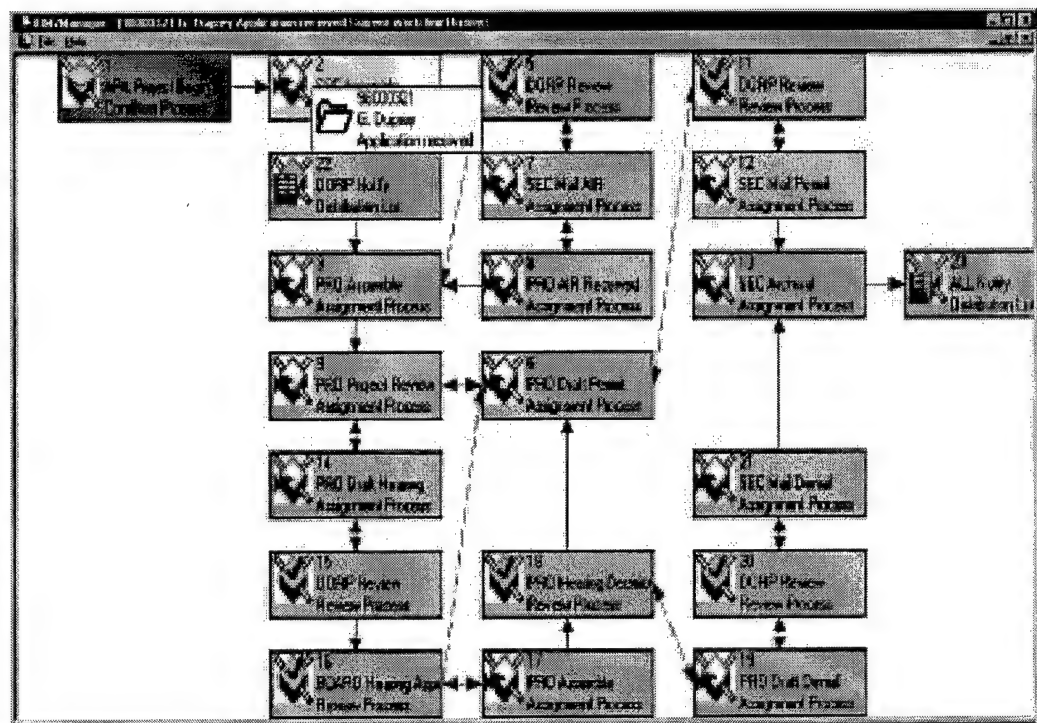
Data entry screens

The data entry screens were designed using Visual Basic. They are structured in a consistent format and operate in a manner similar to Windows applications. For those elements or attributes with pre-defined values such as town, county, project type, and map type, drop-down menus are provided to decrease data entry time and increase accuracy. Within each data entry screen, key information elements are defined as required, and the completion of the data entry for that screen requires that values for these fields be provided.

Workflow - staff assignment and project routing

The workflow component allows for the assignment of different types of staff to a project. For example, when creating a new project, the system allows for the assignment of a PRO and natural resource and legal staff. The system also allows for the assignment of individuals to receive notification about a given project. This feature allows individuals who have no pre-defined responsibility or assignments within a project to be kept posted on project progress. The workflow component also routes a project record through the process after an individual has completed a step or sub-task within the workflow. As people sign off on a task, they are allowed to provide comments or notes that can be read by the next individual in the process. The project record moves to the next step in the process based upon the value selected upon sign-off. The diagrammatic representation of the workflow for the minor project permit process is shown in Figure 9. The workflow diagram can be used to identify where in the process, a given project is at any point in time. The workflow software also provides a narrative list of the steps that have been conducted including the start and finish time for the step and the individual who conducted it. The workflow functionality can also be used to address records management requirements associated with authorizations for modifications to a record. While not fully implemented in the prototype, the software has the capability to allow deletions, additions, or modifications to a project record or to individual record components based on where the project is in the overall review process or other conditions.

Figure 9. Minor project review workflow



Forms generation

The forms generation feature serves a number of purposes. First, it decreases staff time in repeatedly typing the same information across documents related to a specific project. Second, it minimizes the potential for error by drawing upon attribute values already in the database. Third, the use of standard clauses increases the consistency of permits and AIRs (assuming the Agency staff reach consensus about standard language for use in the system).

The prototype is designed so that relevant values entered into the system are automatically placed in the template for the document type under development. Additionally, both permits and AIRs contain some set of standard language. The system provides a pick list or menu of these standard clauses that can automatically be added to a document under development. Once this language is added in the data entry screen, it can be modified if necessary, either within the data entry screen or within the document itself. Figure 10 shows an example of a document creation screen for an AIR. This screen shows the menu choices for items requested in an AIR and also provides data entry points for other information that will be placed into the document.

Figure 10. Forms generation feature

The screenshot shows a software window titled "AIM (Asset & Information Management) : New AIR". The window contains several input fields and a list of standard clauses. At the top, there are fields for "Project #:" (containing "98000123"), "Project Sponsor", "Type of Project" (containing "Slide, hunt - fish cabin"), "Location of Project", "Date Application Received", and "Authorized Representative". Below these is a text area with the following content: "The materials supplied with the above referenced application for a permit to provide an excellent introduction to the proposed project. However, additional information is necessary to". Below this is a "Send Date:" field. A list box on the left contains the following items: "LEGAL", "1-", "2-", "3-", "4-", "5-", "6a-", and "6b-". The "LEGAL" item is selected. To the right of the list box is a text area containing the following text: "Contact Adirondack Park Project Review Officer, Suzanne B. McSherry to arrange a meeting at the project site. Scheduling of site visits must be arranged with Agency staff well in advance. After the site visit, the Agency will determine if all of the originally requested information is still necessary." To the right of this text area is an "Insert Text" button. Below the list box is an "Available Files:" field containing "clmti". To the right of this field is a "Check In" checkbox. At the bottom of the window are four buttons: "OK", "Apply", "Cancel", and "Reset".

As indicated above, any information needed for the document that is already in the database, will automatically be called up and placed in the appropriate place in the document. Following the creation of the document, the user has two choices. One is to print the document to a file which will create an actual electronic file of the document that can then be attached to the project record. The second choice is the print option which sends the document to a printer so that it can be mailed to an applicant. In those cases where the document has to be signed or notarized by APA staff per legal or regulatory requirements, the signed and notarized original can be scanned into the system and attached to the project record.

Search capabilities

Perhaps one of the most useful features of the system in terms of improving access to records at APA, is the search and retrieval capability. This feature allows the user to search at either the document level or the project level based on any attributes contained in the database. The interface supports simple or complex queries that can be developed easily using pull down menus. In much the same way that the data entry screens were developed, the search screens allow for the selection of attributes on which one can search. For those attributes with pre-defined values, once the attribute is selected, the available values are presented for selection in the search. Once a search is developed and submitted to the system, the records or documents that meet the search criteria are listed in the bottom of the search screen. If the search was conducted at the record level, the search results will show all of the records that meet the search criteria. By double-clicking on a given record, all of the document types contained within that record will be displayed. By double-clicking on a document type, all of the actual documents or files of that document type will be displayed. Double-clicking on a specific document or file invokes the Intergraph Redline tool which allows for the viewing of a particular document. Figure 11 shows the document search and retrieval screen.

Document viewing and mark-up capabilities

As indicated above, the prototype supports the viewing of a specific document or file within a project record by using a product that allows for the viewing of 70 different types of file formats. This is a particularly useful tool from a records management and archival perspective because it allows a user to view documents created in a multitude of file formats across a range of software packages without having to maintain the native software in which each was created. This has advantages for both current use and future migration. The Redline product also supports non-destructive mark-ups to documents or files. It allows users to create a layer that is associated with a given file without changing the file or document

Figure 11. Searching project review records

The screenshot shows the 'AIM (Asset & Information Management) Search Projects' window. At the top, there are buttons for 'Report', 'Class: Projects', 'Workflow Submit', and 'Add Documents'. Below these is a 'Search:' section with a 'Search Criteria' table. The table has two columns: 'Attribute' and 'Value'. The first row shows 'Revision' in the 'Attribute' column and '=' in the 'Value' column. To the right of the table are buttons for 'Reset List', 'Add To List', and 'Do Search'. Further right are dropdown menus for 'Name: Revision' and 'Value:', a 'Type: AND' dropdown, and two checked checkboxes labeled 'Latest Rev Only' and 'Latest Ver Only'. Below the search section is a table with the following columns: 'Name', 'Folder Na...', 'Revision', 'Official?', 'Version', 'Checked...', 'User/Vault', and 'Project N...'. The table contains four rows of data:

Name	Folder Na...	Revision	Official?	Version	Checked...	User/Vault	Project N...
98-0417.B. Lewis.Application received	---	A	False	1	False	Working	
Includes							
APDeed.98-0417.Working	---	A	False	1	False	Working	
APAAIR.98-0417.Working	---	A	False	1	False	Working	
JBT-001.R. Jarvis.Application Complete	---	A	False	1	False	Archived	

itself. For example, a user may create a layer with electronic 'post-it notes' or arrows or circles or other annotations that can be viewed by other users but that are maintained as a file or layer distinct from the original document. This feature enhances communication about documents or files among users while maintaining the document in its original form. These layers can be viewed, added, modified, or deleted separately from the original document or file. This feature is particularly useful at APA where the project review staff may want to draw attention to a specific element on a map while communicating with natural resource staff, for example.

Access to APA's GIS

The prototype system also supports access to the Agency's geographic information system. Information contained in the Agency's GIS must be accessed in the project review process. Using Intergraph's GeoMedia product, users can access digital spatial data independent of the software with which it was created. This tool allows for the overlay of multiple map layers and automatically adjusts scales and projections. Following access to and analysis of map layers, the system will allow for the capture of the screen or analysis results into a project record and information about the resulting document or screen capture can be input using the data entry screen for map type documents.

Archival function

As shown in Figure 7 the last step in the minor project review process is the archival function. This step is conducted at a pre-set interval after the project has been completed. At this point in the process, the individual responsible for archiving project records may remove any unnecessary documentation from a project record and move it into an archival vault. Once a project record is inside the vault, it cannot be changed. This feature ensures that records are not modified after a transaction is complete.

Prototype delivery, training, and testing

The prototype system was delivered to APA in March 1998, and was accompanied by presentations of the prototype functionality to the full staff and two levels of user training. One level focused on the functionality of the prototype within the minor project workflow and was provided to those staff who work directly on the project review process. The second type of training demonstrated the use of the prototype for accessing project records for secondary use in the Agency and focused on the prototype's search and retrieval capabilities. A second training review session was held in June to train staff who were not available during the prior training sessions.

Several of the Project Review Officers participated in the testing of the prototype along with one of the Directors of Regulatory Programs, support staff, and representatives from both legal and natural resources. All evaluation participants were asked to use the prototype and think about its features and functionality in terms of improvements to the way they do their own work. They were asked to envision how the system would help specifically within the project review process and more generally about how access to the records and information in the system would support other processes at the Agency.

During the first training session, several project applications that had just been received by the Agency were input into the system. All of the project documents such as the application, maps, and deeds were scanned and the information in and about the documents was input into the system. Staff were assigned to work on each of the projects so that a test could be conducted of routing a project through the system. The individuals participating in the training were asked to run several projects through the system while maintaining parallel paper processes.

At the time of this report the Agency is continuing to test the prototype. Preliminary feedback collected during the project indicated that the prototype successfully demonstrated the potential value of workflow and document management technologies to meet Agency goals. It also generated significant interest in the potential value of developing

standardized permit conditions and AIRs, and in establishing a definition of a legal minimum record for the Agency. Testing of the prototype also served to identify to the Agency staff the necessary management and policy changes that would be required within the Agency to complement a full system implementation, especially the need for changes in the way individuals conduct their work within an automated workflow. They were also able to assess the relative merits of managing workflow electronically versus managing it through the adoption of standard policies and practices. The prototype also served to bring the issues related to effective records management to the attention of the Agency Board.

Chapter 4. Reflections on the Tools

This chapter provides a brief analysis of the effectiveness of the *Functional Requirements* and the RRAIT in the context of their use with the Adirondack Park Agency. It also makes recommendations for future users and identifies several avenues for additional testing and research.

Preliminary conclusions about the effectiveness of the tools

Overall, the use of the practical tools served to identify a comprehensive set of records management requirements and options for addressing them in the context of developing system specifications to support APA's minor project review process. The tools were seamlessly integrated into the system design process and resulted in the identification of technical specifications and opportunities for improving customer service through improved access to Agency records.

The process of using the tools with APA resulted in the identification of a number of critical management and policy issues that must support a full system implementation. In some cases, these issues had previously surfaced in other contexts at the Agency. The process of applying the tools brought these issues to the forefront so that they could be addressed in a structured fashion.

Bringing the record to the forefront of system design activities

In general, the use of the tools served to shift the focus of system design and development away from technology and toward the capture, maintenance, and ongoing use of the Agency's business records. The tools embedded the importance of the record into the system development process from the perspective of both users and system developers. The focus on the minor project record was readily adopted by both APA staff and the corporate partner system developers.

The use of the RREC firmly established the concept of 'record' as the centerpiece of the system design efforts and further brought the maintenance and ongoing accessibility of records to the forefront of the system design and development process. During system design activities, the concept of a record was translated into a 'file folder' object within the structure of an object-oriented data model. This conceptual translation was easily understood by all staff involved in the process. The answers

obtained through the use of the Record Level of the RREC were directly translated into the development of the underlying data model for the prototype. This data model was a critical element of subsequent system design activities.

Identifying electronic records functionality as part of system design

The business requirements that underlie the records management requirements drove the selection of workflow and document management as appropriate supporting technologies. Workflow functionality maps directly to the records capture requirements identified by the Business Process Level of the RREC. The workflow capabilities of the prototype incorporated these requirements as rules about who can modify which parts of a record and at what points in the process. Document management technology was used in the prototype to support records access and maintenance. These two technologies, implemented in a full system, would support the necessary records management functionality for the Agency.

The Record Level of the RREC poses questions associated with ongoing internal and external secondary access to project records. The answers led to the selection of technologies that allow for the viewing of diverse document types, regardless of their native format or creating software, through the use of a single viewing tool. This system feature also prompts consideration of migration issues identified through the use of the System Level of the RREC.

The project prototype demonstrated that the technologies exist to support the necessary functionality of a workflow and document management system to address records management and archival requirements. Document management technologies are available to handle multiple document types, scanning and indexing, complex workflow with branching and condition statements, electronic signatures, and the ability to integrate these within an existing technical infrastructure. However, not every organization has the know-how, infrastructure, or specific tools to take equal advantage of these capabilities. This variability in organizational capabilities underscores the value of the RRAIT which is technology-independent and views a system from a business process perspective.

Creating records that support legal and evidentiary needs

The tools supported the identification of all authenticity requirements tied to the minor project review process including legal admissibility. These requirements were mapped from the Business Process Level to the Record and System Levels. However, many of the authenticity and evidentiary needs could not be implemented by technology alone and must be supported by appropriate management practices and agency policies.

Creating records that are accessible and usable over time

Use of the tools at APA demonstrated that the Business Process Level of the RREC helps organizations identify the specific record components that must be captured at each step during the course of a transaction. The Record Level addresses the need for access to records over time. The RRIC can then be used to identify technology and other mechanisms to ensure that records are appropriately captured and that they remain accessible for both current and future use.

Integrating diverse documentation into records

The Business Process Level of the RREC helped APA identify the diversity of forms and formats that a system must accommodate. The RRIC facilitated the identification of the technical strategies that can be used to ensure that the required forms and formats are integrated into a record and accessed over time. For purposes of the APA prototype, document management and imaging technologies were used to achieve this integration. The viewing tools in particular were chosen for their ability to provide ongoing access to documents created in a variety of formats using a diversity of software packages.

Identifying essential records policies and management practices

The tools facilitated the identification of important management and policy strategies to ensure that records management requirements are met with an electronic system. As in many other organizations, these issues appear to present the most difficulty at APA as their content and execution depend on organizational consensus about the way work should be done.

For example, APA needs to establish a definition of a minimum legal record for a project transaction as well as a list of components that should be maintained in a record after a transaction has been completed. Policies are also needed regarding which of those components are releasable and not releasable under FOIL. The business process improvement effort highlighted the need to shift from an individualistic style of work to more consistent processes across project review staff. System maintenance, security, and user access were identified as critical management and policy issues associated with system implementation. Finally, the prototype, with its automatic forms generation capability, pointed out the need for consensus about standard language for such documents as permits and Additional Information Requests.

Strengths and weaknesses of the *Functional Requirements* and the RRAIT

The test of the tools at APA and their review by the Advisory Committee and outside experts revealed both strengths and weaknesses that future users should consider.

Strengths

The *Functional Requirements* present records management requirements in a way that is understandable to both program managers and technical staff. They are system- and business-process focused, which means that both practitioners and system developers can easily relate to them. The language is clear and, perhaps more important, the requirements comprise a concise set of standards that are readily adoptable by busy managers and professionals in all kinds of organizations.

The greatest strength of the RRAIT is its focus on the business process and business objectives. Substantial positive feedback was received from practitioners as well as records managers and archivists about using the business process as the focus for records management issues. Practitioners indicated that this manner of presentation enabled them to understand the importance of records management requirements in terms of the issues that are critical to them in conducting their work. Records management professionals indicated that this approach helps ensure effective communication with practitioners about records management issues.

The Business Process Level of the RREC was found to facilitate the identification of opportunities for business process improvement. More specifically, the questions that focus on whether the record is modified or changed in the various steps in the process aid in the identification of steps that can be eliminated or modified. The differentiation among process steps required by law or regulation from those based on professional best practices or agency practices helps in the assessment of steps or tasks that are candidates for change or elimination.

Another major strength of the RRAIT is its ability to directly translate records management requirements into user and system requirements. The responses to the questions in the Business Process and System Levels of the RREC are easily communicated to system developers in terms of technical specifications. Additionally, the questions that focus on the documents that comprise a record and on internal and external access to records can be readily translated into data model specifications. The tools call attention to long-term access issues such as migration strategies and meta data that should be addressed at the initial system design stage to avoid high costs in the long run, or worse, loss of access to important records.

The RRIC, with its focus on implementation, highlights the importance of supporting policy and management strategies — critical elements that often receive little or no attention in system development efforts.

The tools have the versatility to deal with both internal and external primary and secondary access to records. The Business Process and Record Levels of the RREC support the identification of access needs from the perspective of internal users during a business transaction as well as internal and external access needs after the transaction has been completed. The questions are designed to identify the components of a record required by each of these user types as well as their preferred or required mechanisms for accessing them. The tools therefore help ensure that the value of information collected and maintained during a business process will be maximized across all user groups.

Flexibility of use was another observed strength. The manner in which the questions are asked and answered can be tailored for use across different organizational contexts. While we strongly recommend that the Business Process Level of the RREC be used in conjunction with some form of business process analysis, the questions in the other sections can be obtained using a variety of methods such as surveys and interviews. In short, the tools provide a sound framework for the identification of records management requirements that can be modified to suit any organizational setting.

Weaknesses

Perhaps the biggest weakness of the tools is the pre-condition for their use. That is, an organization must first recognize the importance of its business records and the costs and risks associated with ignoring them. Without this foundation, it is unlikely that an organization will invest the time and attention to detail that the tools demand.

Second, while the tools support the comprehensive identification of records management requirements and mechanisms for addressing them, the degree to which they are implemented depends on the organization's readiness and willingness to change. Change means more than new information systems; it requires supporting management and policy strategies as well as an understanding of the degree to which the requirements can be addressed by the chosen technologies. In short, while the tools support the identification of requirements, the factors that surround their implementation determine the ultimate level of success.

Another limitation has to do with technology selection. While the tools provide a framework for the identification of technology requirements, they do not address the actual selection of hardware and software. The tools emphasize the selection of technology solutions that maximize interoperability and adherence to standards, but they are not designed to

support product selection. Rather, they help organizations identify the functionality that is required in a system to support records management requirements. Selection of specific products to provide the necessary functionality must be based on myriad factors which include existing infrastructure (both technical and organizational), cost, and expected benefits.

Suggested context for use

One of the most critical factors for effective use of the tools is getting the right people to answer the questions. All the internal and external primary and secondary users of the records that will be created and maintained by an information system should be represented. While only a sample of each user type may be involved in answering the questions, it is critically important that all of the types or groups of users be consulted. It may be necessary to bring legal staff or executive management into the process. Legal staff can assist in the identification of statutory or regulatory requirements, while executive level staff will need to be involved in the development of policy and management strategies. Individuals with knowledge of the professional practices associated with a given process are also important participants. System development or technology experts can also play an important role in addressing the questions and providing information about product capabilities in supporting records management requirements. Not all of the players are required during the entire process; some may be brought in to assist as different questions are being addressed. However, identifying and involving all key players at the appropriate point in the process is critically important to the successful use of the tools.

As discussed earlier, several methods can be used to answer the questions in the RRAIT. We strongly recommend that the Business Process Level questions be answered in the context of a business process analysis or improvement activity. The methods for answering questions in other sections should be selected for their compatibility with the organization's skills and time schedules, and their ability to minimize the total cost of the information collection process.

We strongly recommend that technology awareness activities be conducted in conjunction with the use of the tools. Product reviews, vendor presentations, and conferences focused on technology applications are all ways to increase awareness of technology capabilities and limitations among the staff who will work with the new system. These kinds of activities increase understanding of the strengths and weaknesses of technology types and specific products. A broad appreciation for what technology can and cannot do will help the organization make appropriate technology choices.

Additional research and testing of the tools

Evaluation of the tools developed in this project is limited by the fact that the information system did not go beyond the prototype phase. Without experience in a full system implementation, we can make only the preliminary observations above. A more robust test of the tools would require a much longer period of time and would involve using the tools to conceptualize and design a full system, implementing the system in an operational environment, and testing the degree to which the records management issues have been addressed.

Additionally, the tools have been tested in one state agency using one set of delivery methods. Additional research and evaluation activities should be conducted with other government agencies and with private sector organizations using a variety of delivery methods to confirm the generalizeability of the framework.

Lastly, the project results strongly suggest that the development of appropriate management and policy strategies is one of the biggest barriers to implementing systems that meet records management requirements. Therefore, additional research to confirm this observation would be of great value, as would research that identifies and tests mechanisms for overcoming these barriers.

Chapter 5. Value of the Project

Value to the archives and records management community

- ◆ The project successfully extended theory to practice. It drew from the theoretical foundations of the profession and transformed them into categories of requirements that are usable and implementable in the context of organizational operations. The practical tools are robust and understandable by practitioners in both the public and private sectors.
- ◆ The project emphasis on practical tools and the importance of linking records management issues to organizational business processes provides a mechanism for improved communication between records management professionals and practitioners. The tools provide a common language and foundation for discussions of records management issues in the context of work that is critical to organizations that are developing information systems.
- ◆ The project demonstrated that the technology to support the integration of records management and archival requirements into an information system is currently available. However, appropriate management and policy strategies must also be identified and implemented to complement these technologies.
- ◆ The project products have been shared widely in interim form and are already being used. For example, the International Records Management Trust in London used them as a framework for a needs analysis focused on records management in a paper-based environment. They were also adopted for use by the records management staff at a leading banking institution.

Value to NHPRC

- ◆ The project built upon, integrated, and extended the results of several previous NHPRC-funded projects. As a result, the broader community of researchers, and records and archives professionals now have methods and tools to support the management and preservation of electronic records that are grounded in theory and tested in practice.

- ◆ The project provided NHPRC the opportunity to leverage its funding resources to reach a new and diverse practitioner community. Within that community, the project increased awareness of NHPRC and its interest in and support for the development of practitioner-oriented tools.

Value to recordkeeping organizations in all sectors

- ◆ The absence of methodologies that incorporate electronic recordkeeping requirements has been a key barrier to the effective development of information systems that also meet records management requirements. This project delivered a generalizable methodology to practitioners to overcome this barrier.
- ◆ The prototype system demonstrated the importance and the feasibility of incorporating records management requirements into the system design and development process rather than developing costly changes after a system has been put in place. It also demonstrated that currently available technology can provide this capability for a range of business purposes.
- ◆ The project raised awareness about the nature and extent of planning required to include records management functionality in new information systems.

Value to the Adirondack Park Agency

- ◆ As a result of the project, the APA Commissioners and other stakeholders in the Park recognize the important contribution an electronic records management program can make toward the achievement of APA's mission to preserve the quality and vitality of life in the Park. These important constituencies now have a deeper understanding of the direct and indirect benefits of maintaining access to electronic records to support Agency operations and performance measurement.
- ◆ The project demonstrated the importance of taking user perspectives and requirements into account in implementing technology solutions. All stages of planning, design, and implementation of the prototype incorporated both management and user perspectives and requirements. As a result, the project effectively translated electronic records management concepts into usable terms in the context of the Agency's business process.

- ◆ The business process analysis activities resulted in a common understanding of the steps involved in the minor project review process from the perspective of all of the individuals involved either directly and indirectly, including line, management, and executive staff. The business process improvement activities, supported by the Business Process Level of the RREC, helped identify opportunities for modifying the minor project review process in order to improve customer service. Through the business process improvement activities and the secondary access requirements survey, primary and secondary information access needs were also identified and reflected in the prototype.
- ◆ The project assisted in the identification of important policy and management strategies that must be addressed in support of full system implementation.
- ◆ The project provided APA staff the opportunity to work with the latest technologies to support workflow, document management, and GIS integration.

Value to corporate partners

- ◆ The project provided the opportunity for Intergraph Corporation to evaluate the applicability of a new product and to test its robustness and versatility in a complex workflow process. The prototyping experience generated ideas for new applications, enhancements, and refinements.
- ◆ The project provided the corporate partners the opportunity to test the integration of some of their newest products in solving a real world problem by allowing for realistic testing of the openness of the products and their ability to be integrated with each other and within an existing technological environment.
- ◆ Corporate partners had the opportunity to work in an atmosphere of research and experimentation which allowed them to engage in a joint problem solving effort with a government agency.
- ◆ The project provided substantial information dissemination opportunities about the corporate partner products used in the development of the prototype to new and existing customers.

Value to the university community

- ◆ The project results are being used to educate archivists and records managers about possibilities for addressing many long standing electronic record issues. The project products are being incorporated into curricula at the University at Albany, the University of Maryland, and Catholic University. An article on the project published in the *Bulletin of the American Society for Information Science* is required reading in a Library Science course at Catholic University.
- ◆ The Models for Action project is a valuable teaching example for archival educators. While much has been written in theory about the desirability of incorporating archival concerns into the design of electronic recordkeeping systems, there have been few examples of attempts to actually do so. This project will help the graduate archival education community demonstrate the viability of archivists taking a broader view of their responsibilities for recordkeeping. Because it represents a true collaboration between archivists, Agency staff, and university-based researchers, the project offers practicing archivists a useful model for working on electronic records problems in their own environments.
- ◆ The project funding provided support for a faculty member from Albany's Rockefeller College of Public Affairs and Policy to conduct a two-day cost and performance workshop with APA staff, which helped the Agency staff envision various levels of full system implementation based on their experience with the prototype.
- ◆ The project funding supported two Computer Science graduate assistants for two years. In addition, graduate assistants in Information Science and Public Administration who were supported by CTG funding, had the opportunity to participate in project research and planning, design and development of the prototype, and in on-site work at APA. A student intern completed her second year MBA project by participating in the design, development, documentation, and evaluation of the project prototype.

Value to SARA

- ◆ The project served to solidify a program direction and perspective for SARA's electronic records management services to government agencies. The project clearly underscored the advantages and continuing need to focus the program on practical tools to integrate electronic records management into the normal course of business, linking records management with other business concerns using a language that is understandable to these customers. SARA will also continue to focus its services on system development and records creation as well as the maintenance and retention of electronic records. It will continue to emphasize a customer service approach to records management in which relevant services are continually developed to address the issues raised by the rapidly evolving technological and organizational environment of state and local government.
- ◆ SARA identified new ways to present records management and archival issues so that government technical and program managers could conceptually integrate them with other business and technical concerns. SARA now has the ability to put records issues in a broader business context and perspective.
- ◆ The project provided SARA a vehicle for educating its business partners, government agency customers, and the vendor community about records management issues. The project generated tremendous interest among government officials, demonstrated by the over 200 registrants for the project's public demonstration. Many others followed the project's progress through the vehicles of the newsletters and Web sites of the New York State Forum for Information Resource Management, CTG, and SARA.
- ◆ The *Records Requirements Analysis and Implementation Tool* (RRAIT) will be integrated into SARA's array of services. During the last few years, SARA has been attempting to develop staff expertise in business process analysis and improvement (BPA/I) techniques. SARA direct service staff will be trained to use the RRAIT as part of their BPA/I 'tool kit.' The *Functional Requirements* and the RRAIT will then be infused in SARA training and other publications, influencing the way it presents records management to its primary customers, state and local governments in NYS. New training sessions from SARA will incorporate the *Functional Requirements* as an effective communication tool bridging the language barrier between staff at SARA and the practitioner community. SARA is developing a BPA/I workshop for government officials that will include training on using the RRAIT. A pilot workshop will be developed and tested in the fall of 1998 and regular BPA/I workshops will begin in the spring of 1999. The project prototype at APA will likely be used as a case study in this workshop.

- ◆ SARA benefited from the close working relationship with the project team including consultants, academics, information technology professionals, and information technology vendors. These relationships have allowed SARA staff to gain needed familiarity with important sectors of the information technology environment, positioning it to influence the implementation of network-based technologies in State and local government.

Value to CTG

- ◆ The research activities supported by this project further strengthened the Center's awareness of ways in which archival and records management issues can be incorporated into the information systems development process. The RRAIT will continue to be used to support business process analysis and system design efforts in future CTG projects. For example, the RREC is currently being used in CTG's *Using Information in Government Program* as a mechanism for helping the participants identify the information needed to support program evaluation, policy analysis, and decision making.
- ◆ The project provided CTG opportunities to work with a new community of professionals from the archival and records management field. In particular, the project strengthened CTG's working relationship with SARA and introduced the staff to a variety of experts whose advice will continue to be sought in the future.
- ◆ Throughout the project, CTG staff developed an increased appreciation for the issues associated with secondary access to valuable information created by government agencies. As a result, CTG submitted and received funding for a second NHPRC project, *Gateways to the Past, Present and Future: Practical Guidelines to Secondary Uses of Electronic Records*, which will build upon the results of *Models for Action*. The *Gateways* project, a continuing partnership with SARA, will focus more specifically on records management issues and models for maintaining and supporting access to records for internal and external secondary uses.

Appendices

- A. Project Participants
- B. Archival and Records Management Expert Reviewers
- C. Project Timeline
- D. Information Dissemination Activities
- E. Records Requirements Analysis and Implementation Tool
- F. Related Products
- G. References and Related Web Sites

Appendix A. Project participants

Project Advisory Committee

Pamela Akison, NYS Department of Health
Jerry Barber, NYS Office of State Comptroller
Kevin Belden, NYS Department of Taxation and Finance
Betty Borowsky, Nassau County Health Department
Thomas Clingan, Albany County Clerk
Ted Collins, Kodak/Boyle Associates
Ed Donohue, NYS Workers Compensation Board
Philip Eppard, School of Information Science & Policy,
University at Albany
Ruth Fraley, NYS Office of Court Administration
Stephen Gallagher, NYS Bar Association
Thomas Galvin, Doctoral Program in Information Science,
University at Albany
Susan Herrmann, Key Services
Terry Maxwell, NYS Forum for IRM
Thomas Mills, State Archives & Record Administration
Bruce Oswald, NYS Office for Technology
Will Pelgrin, NYS Office for Technology
Dixianne Penney, Center for the Study of Issues in Public Mental Health
Peter Poleto, NYS Department of Motor Vehicles
Robert Sandusky, Key Bank
Greg Sheppard, Capital District Physician's Health Plan
Sam Wear, Westchester County

Corporate Partners

Audio Visual Sales and Service
Hewlett-Packard
Intergraph Corporation
Image Conversion Systems
Oracle Corporation
MediaServ
Microsoft Corporation
Sybase Inc.

Adirondack Park Agency

Christopher Anderson, Project Review Specialist
John Banta, Director of Planning
William Curran, Director of Regulatory Programs
Eleanor Duffus, Project Review Specialist
Gary Duprey, Associate Project Review Specialist
Stephen Erman, Special Assistant, Economic Affairs
Daniel Fitts, Executive Director
Mitchell Goroski, Staff Attorney
Brian Grisi, Associate Analyst, Forest Resources
Nancy Heath, Principal Clerk
Edward Hood, Assistant Director of Planning
Richard Jarvis, Supervisor, Project Review
Theresa LaBaron, Secretary
Suzanne McSherry, Project Review Specialist
Jim Marrin, Counsel
George Outcalt, Associate Project Review Specialist
John Quinn, Associate Project Review Specialist
Colleen Parker, Project Review Specialist
Barb Rottier, Associate Counsel
Thomas Saehrig, Project Review Specialist
Henry Savarie, Senior Natural Resource Planner
Richard Terry, Senior Attorney

State Archives & Record Administration

Alan Kowlowitz, Senior Archivist
Betsy Maio, Records Management Specialist

University at Albany

Office of Telecommunications
John Rohrbaugh, Professor, Department of Public Administration
and Policy

CTG Staff & Students

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Ann DiCaterino, Manager, Project Support
Darryl Green, Manager, Project Support
Mballou Kaba, Graduate Assistant, School of Business
Kristine Kelly, Project Research Manager
Kai Larsen, Graduate Assistant, Information Science
Theresa Pardo, Project Director
Mei-Huei Tang, Graduate Assistant, Computer Science
Wen-Li Wang, Graduate Assistant, Computer Science
Derek Werthmuller, System Administrator

Appendix B. Archival and records management expert reviewers

Margaret Adams, Center for Electronic Records
National Archives and Records Administration

Richard Barry, Barry Associates

Philip Bantin, University Archives, Indiana University

David Bearman, Archives & Museum Informatics

Richard Cox, School of Library and Information Science
University of Pittsburgh

Charles Dollar, School of Library, Archival, Informational Studies
University of British Columbia

Mark Giguere, National Archives and Records Administration

Anne Gilliland-Swetland, Department of Library and Information Science
University of California at Los Angeles

Margaret Hedstrom, School of Information, University of Michigan

Paul Hedges, State Historical Society of Wisconsin

Richard Kessner, Horner Library, Babson College

Michael Miller, Office of IRM, US Environmental Protection Agency

John McDonald, National Archives of Canada

Charles Robb, Kentucky Department of Library & Archives

Gregory Sanford, State Archivist, Vermont State Archives

Kenneth Thibodeau, Center for Electronic Records
National Archives and Records Administration

Robert Williams, Cohasset Associates, Inc.

Appendix C. Project timeline

Date	Activity
June 1995	Grant proposal submitted to the National Historical Publications and Records Commission
March 1996	Project activities begin
October 1996	Project Concept Paper released
October 1996	First Meeting of the Project Advisory Committee
November 1996	Conducted review of project products to-date with recognized experts in archival and records management discipline
December 1997	Interim Product Released - <i>Functional Requirements Version 1</i>
March 1997	First Business Process Improvement Workshop at the Adirondack Park Agency
May 1997	Second meeting of the Project Advisory Committee
July 1997	Second Business Process Improvement Workshop at the Adirondack Park Agency
August 1997	Interim Product Released - <i>A Survey of Key Concepts and Issues for Electronic Recordkeeping</i>
September 1997	Partnership with Intergraph established
October 1997	System Overview and Functional Specifications defined
November 1997	Interim Product Released - <i>An Introduction to Workflow Management Systems</i>
December 1997	Analysis of APA's Additional Information Request process
December 1997	Prototype Development Begins
February 1998	Interim Product Released - <i>A Survey of System Development Methodologies</i>
March 1998	Prototype delivered and installed at APA; Staff trained, prototype use and evaluation begins
April 1998	Cost and Performance Workshop with the staff from the Adirondack Park Agency
April 1998	Interim Product Released - <i>The Records Requirements Analysis and Implementation Tool</i>
April 1998	Interim Product Released - <i>Functional Requirements - Final Version</i>
April 1998	Grant Period Ends
June 1998	Public Demonstration of Results
August 1998	Final Project Report Distributed

Appendix D. Information dissemination activities

Date	Activity
May 1997	Attended Working Meeting on Electronic Records in Pittsburgh
June 1997	Article about the project was published in the June/July 1997 issue of the <i>Bulletin for the American Society for Information Science</i>
July 1997	Presentation of Project Activities at URISA '97
July 1997	Presentation of Project Activities at NAGARA '97
August 1997	Presentation of Project Activities at SAA '97
October 1997	Presentation to the NYS Office for Technology Workflow Working Group
December 1997	Presentation of Project Activities to Ken Thibodeau, Director, Center for Electronic Records, NARA
January 1998	Presentation at the NYS Commissioner of Education's Quarterly Review
March 1998	Presentation at "The Information Ecosystem: Managing the Life Cycle of Information for Preservation and Access" sponsored by the Northeast Document Conservation Center
March 1998	Presentation to Center for Electronic Records, NARA
April 1998	Presentation/Discussion with the Chief of the Records Information Systems Unit, United Nations
June 1998	Presentation of Project Results to Adirondack Park Agency Board
June 1998	Public Demonstration of Project Results and Prototype to NYS organizations
June 1998	Presentation to Information Policy Class, Professor Bruce Dearstyne, Information Science and Policy Program, Rockefeller College
July 1998	Presentation of Project Results at URISA '98
August 1998	Presentation of Project Results at SAA '98
September 1998	Presentation of Project Results at GTC East '98

Appendix E. Records Requirements Analysis and Implementation Tool (RRAIT)

The RRAIT is comprised of two parts: the *Records Requirements Elicitation Component* (RREC) and the *Records Requirements Implementation Component* (RRIC). Combined, these components facilitate the identification and implementation of application-specific records management requirements.

The RREC facilitates the identification of records management requirements during business process improvement and systems analysis activities. The RREC itself is divided into three levels:

- ◆ Business Process Level - focuses on those records management requirements associated with the business process that is to be automated
- ◆ Records Level - captures records management requirements associated with access and use over time, for both the record in aggregate and its component parts
- ◆ System Level - focuses on how, from a technical standpoint, the information system will accommodate the integration of and ongoing access to record components

The RRIC focuses on the identification of management, policy, and technology strategies that address the requirements once they have been identified.

Business Process Level

Records Requirements Elicitation Component Business Process Level				
1. What is the transaction to be automated (from the perspective of the customer)				
2. What are the subtasks associated with the transaction?*				
3. For each of the subtasks...				
	Basis for the answer			
	Legal	Regulatory	Best Practices	Agency policies & practices
A. What is the purpose of the sub-task? Is it intended to fulfill a legal, regulatory, or operational purpose?				
1. Are there any 'when' or 'how' requirements for the transaction? (i.e. time clocks or standard professional techniques)				
B. What other documents or information need to be accessed during the sub-task?				
C. Is the record of the transaction created or modified?				
1. If yes, at what point in the transaction is the record created or modified?				
2. Who is authorized to change or modify the record?				
3. What is the content of the record or the component of the record created or added during the sub-task?				
a. Are there documents or information created by other systems that need to be integrated into the record?				
b. Is there any information about the component of the record that needs to be collected and maintained?				
c. Are there any proofs of authenticity associated with the content created or modified during the sub-task?				
*A sub-task starts a process and ends with a decision point or completes the transaction.				

Steps involved in using the Business Process Level of the RREC

- ◆ Gather background information to identify records management issues. Interviews, surveys, and focus groups are useful for this step.
- ◆ Create a process model or diagram that presents the entire business process that is the focus of the analysis. This can be done in a group setting or one or a few people can draft the diagram for review by those who participate in the business process.
- ◆ Conduct a workshop or group decision conference with all staff involved in the process to accomplish the following:
 - ◆ Develop consensus and common definitions around the process diagram representing the current business process.
 - ◆ Identify sub-tasks or logical breaks in the process.
 - ◆ For each of the sub-tasks, pose the questions in the Business Process Level of the RREC (careful transcription and organization of responses is critical).
 - ◆ Distinguish wherever possible, whether a records management requirement is associated with a legal or regulatory requirement, professional or agency best practice or policy.
 - ◆ Identify areas where there exists uncertainty in the responses and identify individuals for follow-up.
 - ◆ Based on the responses, begin to identify options for improving the business process.
- ◆ Translate the requirements into system specifications.
- ◆ *Hints:*
 - ◆ Sub-tasks that result in no change in the record are likely to add no value to the process and may be candidates for modification, elimination, or movement to another part of the process.
 - ◆ Minimizing the number of times that a record is passed back and forth between staff within a process can reduce total transaction time. Attempt to identify opportunities for consolidating task work within a pass.
 - ◆ Records management requirements that are not based upon legal or regulatory requirements are candidates for modification or elimination. For each of the identified requirements, ask the questions "Why is it done?" and "Does it need to be done?"

Record Level

Records Requirements Elicitation Component	
Record Level	
1. What are the current components of a complete or final record of the transaction?	
2. What are the minimal components to provide evidence of the transaction? (If you went to court, what would be the minimum information that you would need?)	
3. Are there any laws, regs, or professional best practices that specify the structure (including medium, format, relationships) of the record of the transaction or any of its components?	
4. What information needs to be created to control, manage, and access the record throughout its life-cycle? (What information about the record do you need e.g. who created it etc.)	
5. For each of the components of the record, what information is essential to access, verify the authenticity, interpret the contents etc.	
6. During what other Agency business processes might you have to access this record?	
A. For each of the business processes, what components of the record need to be accessed?	
business processes, secondary uses, what are the most efficient/effective ways of accessing the records (i.e. indexing)?*	
7. Who are the external secondary users of the record?	
A. What components of the record do external secondary users require?	
B. For each of these secondary uses, what are the most efficient/effective ways of accessing components of the records (i.e. indexing)?	
C. How will the record be reproduced to meet the needs of internal and external secondary users?	
D. What are the rules, laws, and regs that restrict or open access to these records to external users?	
E. If these records are covered by FOIL: For those components of the record that the Agency wishes to restrict access to, what category of exemption does the component fall under?	
For each of the components, what format are they currently in (e.g. GIS, database, WP, paper- forms narrative maps) and how will they be reproduced for distribution?	
8. What is the record disposition plan?	
9. Who is responsible for authorizing the disposition of records?	
10. Who is responsible for authorizing the development or changes to the records disposition plan?	
* Identify the business process that requires the most robust access and then determine if the other processes require additional access methods	

Unlike the Business Process Level of the RREC, there is no one recommended implementation method for the Record Level. Answers to these questions can be obtained through interviews, surveys, or group decision conferences. The most critical factor in using this level of the RREC is identifying the appropriate individuals to supply the required information.

Steps involved in using the Record Level of the RREC:

- ◆ Identify all the internal and external users of the record generated by the business process. If necessary, identify a representative sample of users to address the record access needs questions.
- ◆ Identify and gather the required information from individuals within the organization who are familiar with the legal, jurisdictional, and professional best practices associated with the record of the transaction.
- ◆ Identify and gather the required information from individuals internal or external to the organization who have responsibility for or authority with respect to the management and disposition of records.
- ◆ Translate the requirements into system specifications.

System Level

Records Requirements Elicitation Component System Level
How will the system accommodate the required integration of records from other systems?
What other systems might these records be migrated to?
What is your systems migration plan?
For each of the technologies being used to support the business process:
What are the metadata requirements?
What are the industry standards?
What are the jurisdictional standards?

Steps involved in the use of the System Level of the RREC:

- ◆ For each of the document or record component types, identify how the system will support its integration into the record. In those cases where the record component can not be included into the record directly, develop an indexing and storage strategy to identify the component and its location outside of the record.
- ◆ Identify other systems that the records may be exported or migrated to over time.
- ◆ Develop a migration plan that includes consideration to each of the identified document or record component types.
- ◆ In conjunction with the use of the RRIC, described below, identify the required meta data, industry, or jurisdictional (state, local, federal) policies, procedures, and standards that must be accommodated by the system.
- ◆ Translate these requirements into system specifications.

RRIC

Records Requirement Implementation Component (RRIC)
For each of the identified records management requirements:
Can it be addressed through technology?
If yes.... will policies need to be developed or changed? what sorts of management practices will be required?
If no, What policies and management strategies will support the requirements?

While there is no pre-defined method for implementing the RRIC, it is very useful to conduct it in conjunction with technology awareness activities. We recommend an iterative process of technology awareness, feasibility assessment, and technology selection. This approach helps the organization understand the full range of technology options and their costs and benefits as part of the determination as to whether records management issues should be addressed by management, policy, or technology strategies. Ideally, an organization should strive to maximize the use of technology, and rely less on human factors to ensure that records management issues are addressed. However, this may not always be cost-effective or feasible. Therefore, the costs and benefits of technology strategies compared to management and policies strategies should be addressed as a component of the RRIC.

Steps involved in using the RRIC:

- ◆ Gather information about potential technology choices to support the business process and associated records management requirements.
- ◆ Gather information on such costs as hardware, software, training, development, system integration, development, etc.
- ◆ Assess organizational capabilities or organizational readiness for the adoption of new technology.
- ◆ Conduct an analysis of the feasibility of using initially selected technologies to address the records management requirements.
- ◆ Test the technological capabilities and reassess feasibility for implementation.
- ◆ Identify required complementary policy and management strategies to support the identified technology components.
- ◆ Identify individuals within the organization to assist in the development of and implementation of required management and policy strategies.

◆ *Hint:*

The framework below is a useful way to record and compare the different strategies that could be used to implement records management requirements:

Comparison of Implementation Strategies for Records Requirements			
	Strategies		
	Policy	Management	Technology
Requirement 1			
Requirement 2			
Requirement 3			
Requirement ...			

Appendix F. Related products

Unless otherwise noted, all papers are available on the CTG Web site at <http://www.ctg.albany.edu/projects/er/ermn.html>

Betsy Maio. *A Survey of Key Concepts and Issues for Electronic Recordkeeping, Models for Action Project Working Memo CTG. MFA-001. August 1997.*

A review of technology standards, government policies, legal principles and best practices was conducted in April 1996 addressing key issues the project expected to encounter during the design and development of the APA prototype. This report outlines the results of that survey and is intended to serve as an introduction to key concepts and to guide the associated choices which APA is expected to face as they move from a largely paper-based business process to a networked document management and workflow system.

Ann DiCaterino, Kai R. Larsen, Mei-Huei Tang and Wen-Li Wang. *An Introduction to Workflow Management Systems, Models for Action Project Working Memo CTG.MFA-002. November 1997.*

This document provides an introduction to Workflow Management Systems. Through a two-tiered approach, the reader is first exposed to a functional review of workflow systems, including definitions, typical features, benefits, tradeoffs, process selection, and success factors for implementation, followed by a technical overview that describes a method for categorizing workflow products, the state of the market, and emerging standards.

Darryl Green and Ann DiCaterino. *A Survey of System Development Process Models, Models for Action Project Working Memo CTG. MFA-003. February 1998.*

This document provides an overview of the more common system development *Process Models*, used to guide the analysis, design, development, and maintenance of information systems. There are many different methods and techniques used to direct the life cycle of a software development project and most real-world models are customized adaptations of the generic models. While each is designed for a specific purpose or reason, most have similar goals and share many common tasks. This paper explores the similarities and differences among these various models and discusses how different approaches are chosen and combined to address practical situations.

Kristine Kelly and Alan Kowlowitz. *Functional Requirements to Ensure the Creation, Maintenance, and Preservation of Electronic Records*, Models for Action Project Working Memo CTG. MFA-004. April 1998

This document introduces one of the foundations for the *Models for Action* project, the Functional Requirements to Ensure the Creation, Maintenance, and Preservation of Electronic Records. These Requirements, which were based on the results from the Pittsburgh Project, outline basic standards for sound electronic recordkeeping practices within an organization. This paper discusses the background, development, and usage of the Functional Requirements.

Kristine Kelly and Alan Kowlowitz. *The Records Requirements Analysis and Implementation Tool*, Models for Action Project Working Memo CTG. MFA-006. April 1998.

This document describes the Records Requirements Analysis and Implementation Tool (RRAIT) one of the key products developed for the *Models for Action* project. The RRAIT is a practical tool that is made up of two components: the Records Requirements Elicitation Component (RREC) and the Records Requirements Implementation Component (RRIC). The former is used to define organizational recordkeeping requirements and the latter is used to identify mechanisms for implementing those requirements. This paper examines the makeup of these tools and explores how the two are used in conjunction with each other to define and implement policy, management, and technology mechanisms to implement sound electronic recordkeeping practices within an organization.

Models for Action: Developing Practical Approaches to Electronic Records Management and Preservation - June/July 1997 issue of the Bulletin for the American Society for Information Science, located at
<http://www.asis.org/Bulletin/Jun-97/albany.html>

Darryl Green, Mballou Kaba, Kai Larsen, and Derek Werthmuller. *Models for Action Technical Results from the APA Prototype*, Models for Action Project Working Memo CTG.MFA-007. July 1998.

This report presents the findings of the CTG technical staff responsible for developing the *Models for Action* prototype. Within this report we examine the prototype objectives and functionality, the role of our corporate partners in the development process, and the development, installation and evaluation of the prototype. We conclude with a brief discussion of challenges and opportunities for similar development efforts.

Appendix G. References and related Web sites

Bulletin for the American Society for Information Science,
<http://www.asis.org/Bulletin/Jun-97/albany.html>

Commission on Access and Preservation and Research Libraries Group.
Preserving Digital Information: Report of the Task Force on Archiving of
Digital Information (May, 1996).
<http://www.rlg.org/ArchTF/index.html>

Cook, Terry. "It's 10 O'Clock: Do You Know Where Your Data Are?"
MIT's Technology Review (Jan. 1995).
<http://www.techreview.com/articles/dec94/cook.html>

Defense Information Systems Agency (DISA) - Records Management Page
<http://www.itsi.disa.mil/library.html>

Electronic Records
<http://www.si.umich.edu/e-recs/>

GSA IT Policy OnRamp
<http://www.itpolicy.gsa.gov>

HOME PAGE: Electronic Recordkeeping Requirements
<http://www.sis.pitt.edu/~nhprc/>

National Archives and Records Administration (NARA)
<http://www.nara.gov>

National Archives of Canada
<http://www.archives.ca>

National Historical Publications and Records Commission (NHPRC)
<http://www.nara.gov/nara/nhprc/>

Preservation (Digital Library SunSITE)
<http://sunsite.Berkeley.EDU/Preservation/>

Project Open Book Evaluation
<http://www.dlib.org/dlib/february96/yale/02conway.html>

Research Agenda for Cultural Heritage on Information Networks
<http://www.ahip.getty.edu/agenda>

The Center for Technology in Government
pursues new ways of applying computing and
communications technologies
to the practical problems of information management
and service delivery in the public sector.
The Center's program seeks to reduce the costs
and improve the quality of government services,
reduce the risks of innovation,
and share the results of its projects throughout the public sector.



The New York State Archives and Records Administration (SARA)
is part of the New York State Education Department,
with a broad mandate to provide guidance and services to
help governments better manage their records, to administer the
official State Archives, to regulate the disposal and selective preservation of
State and local government records, and to support activities that strengthen
historical records programs and encourage educational uses of historical records
throughout New York State. SARA is both nationally and internationally
recognized as a leading records management and archival
organization.

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